



ISAKOS

newsletter

ISAKOS Newsletter 2012
VOLUME I

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For more on the
**ISAKOS
CONGRESS,**
please see page 10.



Join Us... ^{9TH BIENNIAL} ISAKOS 2013 CONGRESS

MAY 12-16, 2013 • TORONTO, CANADA

ISAKOS would like to invite you to attend the 9th Biennial ISAKOS Congress! The 9th Biennial ISAKOS Congress will be held in Toronto, Ontario, Canada on May 12-16, 2013. The ISAKOS Congress will bring together internationally renowned faculty in the subjects of arthroscopy, knee surgery and orthopaedic sports medicine. The 5-day ISAKOS Congress is known internationally for exceptional quality and diversity of topics presented. The ISAKOS Program Committee is already hard at work developing a comprehensive program full of Instructional Course Lectures, scientific papers, symposia, lectures, debates, and electronic posters. The 2013 ISAKOS Congress will also provide unique surgical skills education experiences for our registrants in the form of "Personal Training" and Small Group Demonstrations with elite faculty.

Known as the most ethnically diverse city on Earth, the city of Toronto is an ideal host for the many international delegates who will attend the ISAKOS Congress. Known for its international perspective, Toronto has one of the largest non-native populations of any city in the world, with nearly 49% of occupants born outside of Canada.

Consistently voted to be one of the "most livable cities," Toronto is home to a thriving arts scene with more than fifty ballet and dance companies, six opera companies, two symphony orchestras and a host of theatre companies. Congress attendees are invited to visit local attractions such as Toronto's most prominent landmark, the CN Tower, as well as the Royal Ontario Museum, the Toronto Zoo, the Art Gallery of Ontario, the Ontario Science Centre, and the Hockey Hall of Fame. Congress attendees will also visit the city in time to catch a game with the Toronto Blue Jays, who play for the American League of Major League Baseball. From the thrills of modern theme parks to culturally expressive venues with an educational twist, Toronto is rich with excitement.

The 9th Biennial ISAKOS Congress will be held at the Metro Toronto Convention Center. Recently named one of the "best convention destinations in North America", the Metro Toronto Convention Center is located within walking distance of the most prominent tourist attractions within the city, as well as a variety of hotels, restaurants and shops.

You are invited to submit your abstracts now! Abstract submission will remain open until September 1, 2012. Additional information on the 9th Biennial ISAKOS Congress can be found by visiting www.isakos.com/meetings/2013congress. We look forward to seeing you in Toronto!





EVERYTHING IS NEW AT ISAKOS

Everything's new at ISAKOS. However some things haven't changed.

We still have the same great leadership from Europe, Asia-Pacific, and the Americas.

We still have our able administrative office in San Ramon, California lead by Michele Johnson, ISAKOS Executive Director. The Office staff includes Beverlee Galstan, Director of Development; Donna Festo, Finance Manager; Katie Anderson, Program &

Project Manager; Hilary Matthews, Membership & Congress Registrar; and Morgan Huff, Member Services. ISAKOS is also pleased to welcome Liz Boyd, ISAKOS' new Exhibits Manager.

We still anticipate a plethora of ISAKOS-approved courses leading up to our next Biennial Congress in Toronto, Canada. For reports on recent ISAKOS Workshops, and information on upcoming courses, please read through this ISAKOS Newsletter!

We still have great memories of the 2011 Congress in Rio de Janeiro, Brazil.

We continue to develop our Membership, Fellowship Training Program recognition, and Traveling Fellowships. ISAKOS is thrilled to announce that thirty five programs have registered with the ISAKOS International Residency and Fellowship Registry. To join the registry, please go to www.isakos.com/membership/fellowresapp.aspx.

We still have an academic focus featuring research and education. We still have a prestigious awards program committed to recognizing and honoring researchers whose work has contributed to better understanding and communication within the fields of arthroscopy, knee surgery, and orthopaedic sports medicine. ISAKOS is encouraging scientific research through our new ISAKOS Research Grants Program, and spreading information via the ISAKOS Global Link – ISAKOS' online learning portal, a resource for our members around the world.

We still appreciate the support of compliant industry partners who share our interest in research and education, and bring us technological advancements to help us to best serve our patients.

We still have members who travel, and learn, and teach, and investigate, and interact, and share the common goals of achieving professional quality and enjoying fraternity or sorority.

So what's new at ISAKOS?

ISAKOS was formed by the merger of the International Arthroscopy Association and the International Society of the Knee in 1995, so we've entered our teenage years - a phase known to be associated with rapid growth and development. Improvements to the website, new educational initiatives, new international strategic partnerships, and expanding publications are current areas of change, and future innovations are, to be quite honest, unpredictable but inevitable.

So what's new at ISAKOS?

Participate on the ISAKOS website, check out our new publications, encourage a colleague to join ISAKOS, plan on attending our Courses, Workshops, and Congress, and have nothing to fear because ISAKOS continues to achieve that perfect balance of stability and change.

James H. Lubowitz, MD

ISAKOS Newsletter Editor, 2011–2013

What are
all these codes
about?

ISAKOS has included QR Codes throughout this Newsletter to link you to the latest information on our website! Simply scan the code with the bar code reader app on your smartphone and get connected to up-to-date ISAKOS content!

PRESIDENT'S MESSAGE



On behalf of ISAKOS, greetings and Happy New Year! ISAKOS has been hard at work on a variety of projects and initiatives in the months since the 2011 ISAKOS Congress. We are pleased to announce that ISAKOS now has more than 4,200 members from 91 different countries. It is this diversity that makes ISAKOS a premier international organization and our diversity helps to define who we are and what we do.

I recently had the pleasure of participating in the ISAKOS & Chinese Orthopaedic Association Specialty Day, held on December 3, 2011 in Beijing, China. This course was a fantastic opportunity for members of our Executive Committee and leadership to interact with surgeons in this unique region, and pass our wide variety of experience on to a new audience. The Specialty Day agenda included presentations on sports medicine, as well as shoulder, knee, hip and cartilage topics. For more information on this collaborative course, please refer to page 40.

ISAKOS has many initiatives to look forward to as we begin the year 2012. Among the most exciting are two upcoming ISAKOS Workshops currently being planned – the first will be held in Mumbai, India on March 24–25, 2012. The course in Mumbai will be a cooperative effort of ISAKOS and the Indian Arthroscopy Society and will focus on the “Update on Knee Surgery”. The “Update on Knee Surgery” will be a didactic course with optional dry-model workshops.

The next workshop will be the “9th International Forum on Orthopaedic Sports Medicine & Arthroscopic Surgery”, to be held in Shanghai, China on April 26-28, 2012. This course is cosponsored with the Chinese Orthopaedic Association and the Chinese Society for Sports Medicine. This meeting will include didactic sessions, surgical demonstration videos, and a cadaver workshop on Knee and Shoulder.

If you are interested in attending an ISAKOS educational event, we invite you to refer to page 50 of this Newsletter for a list of upcoming ISAKOS Approved Courses and Workshops.

ISAKOS is also pleased to announce the opening of the ISAKOS Global Link! ISAKOS Global Link is ISAKOS’ online library for surgical techniques, Congress archives and published materials, including the ISAKOS Newsletter and ISAKOS Committee Projects. The Global Link has a variety of search functions, including type of media, author, and topic. We invite you to explore the Global Link and send your comments to the ISAKOS Office at isakos@isakos.com. The ISAKOS Global Link is a resource for our membership, and we welcome your suggestions.

Many thanks for your membership with ISAKOS! We look forward to a successful year and many more to come!

Best Regards,

Moises Cohen, MD, PhD
ISAKOS President 2011–2013



ISAKOS would like to congratulate **Dr. Freddie H. Fu**, ISAKOS President, 2009–2011 on receiving the 2011 American Academy of Orthopaedic Surgery Diversity Award, recognizing his work in promoting diversity in orthopaedic surgery.

To watch the award presentation, please visit
<http://www.youtube.com/watch?v=jqic4x2m6TI>.



or scan here and watch it on your smartphone!



ISAKOS WELCOMES NEW MEMBERS

Nasef Mohamed Nasef Abdelatif, MD
Orthopaedic Surgery, EGYPT

Amr Ahmed Abdelrahman, MD,
EGYPT

Daniel Francisco Acevedo, Assistant,
URUGUAY

Mehmet Akif Akcal, MD, MSci,
TURKEY

Aloisio Alan Costa Fernandes, BRAZIL

Oday Al-Dadah, MB ChB, MRCS,
MD, FRCS (Tr & Orth), UNITED
KINGDOM

Francisco Astudillo, ARGENTINA

Jorghe Azevedo, CHINA

Vladimir Badilla, MD, USA

John Andrew Michael Bengzon,
PHILIPPINES

Onur Bilge, MD, TURKEY

Pavlo Bolkhovitin, UKRAINE

You Zhi Cai, MD, CHINA

Xun-Zi Cai, MD, CHINA

Luis Pablo Carrilero, MD, USA

Adrian J. Cassar Gheiti, MD, MALTA

Hong Chang, CHINA

Hong Chen, MD, PhD, CHINA

Zhi Wei Chen, MD, CHINA

You Chen, MD, CHINA

Biao Cheng, PhD, CHINA

Samson Cho, Master, CHINA

Fabio Ramos Costa, BRAZIL

Dennis Charles Crawford, MD, PhD,
USA

Guoqing Cui, MD, CHINA

Bo Cui, CHINA

Guo Feng Dai, PhD, MD, CHINA

Peter Alberto D'Alessandro, MBBS
(Hons), AUSTRALIA

Yu Dang, MD, CHINA

Rafael De Souza Campos Fernandes,
BRAZIL

Shrikant Bal Krishna Deshpande, MS
Orthopaedics, INDIA

Jing Ding, CHINA

Ferdi Donmez, MD, TURKEY

Mingchang Du, PhD, CHINA

Ping Guo Duan, Doctorate, CHINA

Bilal Elyafawi, MD, UNITED ARAB
EMIRATES

Stephen Barry Fine, MD, AUSTRALIA

Wolfgang Fitz, MD, USA

Iosif Gavrilidis, MD, GREECE

Yun Shen Ge, MD, CHINA

Xi Gong, Master, CHINA

Carlos Guillermo Guerrero, MD,
COLOMBIA

Jiong Jiong Guo, MD, PhD, CHINA

Hiroshige Hamada, JAPAN

Thomas William Harris, MD, USA

Yue-Lin Hu, MD, CHINA

Yahuan Hu, CHINA

Yinghui Hua, MD, CHINA

Jia Huang, CHINA

Min Huang, CHINA

Jianming Huang, MD, CHINA

Qiang Huang, MD, CHINA

Wencang Jiao, MD, CHINA

Xuhong Jin, MD, CHINA

Philip Quentin Johnson, MD, USA

Pan Jun, CHINA

Srinivas B.S. Kambhampati, MS,
FRCS, UNITED KINGDOM

Jatinder S. Kang, MD, UNITED
KINGDOM

Alper Kaya, MD, TURKEY

Jong Soon Kim, MD, KOREA

Daniel A. Kleiman Priewer, MD, CHILE

David Knourek, MD, CZECH
REPUBLIC

Yavuz Kocabey, TURKEY

Masashi Kusano, JAPAN

Michael Joseph Leddy, MD, USA

Guang Hua Lei, MD, PhD, Prof.,
CHINA

Zhongli Li, CHINA

Zhong Li, CHINA

Jian Li, CHINA

Yan Lin Li, MD, CHINA

Pang Hei Li, MD, CHINA

Qi Li, PhD, CHINA

Zhao Li, CHINA

Jian Li, MD, CHINA

Qiang Li, CHINA

Junbo Liang, CHINA

Bernard Kuo Hung Lin, MBBS,
MRCS(Edin), MMED(Ortho), FRCS
(Edin) (Ortho), SINGAPORE

Yujie Liu, CHINA

Ning Liu, CHINA

Wenxin Liu, MD, CHINA

Yi Lu, MD, CHINA

Hongzhang Lu, CHINA

Ning Lu, MD, CHINA

Qiuye Lu, CHINA

Ying Lu, CHINA

Bo Lu, CHINA

Hao Luo, Master, CHINA

Gaobin Luo, CHINA

Xing Ma, PhD, MD, CHINA

Xing Ma, PhD, MD, CHINA

Erik Meira, USA

Bruce S. Miller, MD, USA

Hong-Kyo Moon, MD, KOREA

Guo Xin Ni, PhD, MD, CHINA

Bin Ning, MD, CHINA

Salim Kamrudin Noorani, MMed,
KENYA

Eugene Pelser, SOUTH AFRICA

Liang Quan Peng, CHINA

Hannu Penttilä, FINLAND

Jianhong Qi, MD PhD Prof., CHINA

Alberto Restrepo, MD, CANADA

Ricardo Lucas Rodrigues, BRAZIL

Takahisa Sasho, MD, PhD, JAPAN

Giovani Camilo Scopel, Post-
Graduate, BRAZIL

Lin Sha, Master Degree, CHINA

Lei Shi, CHINA

Dong Liang Shi, CHINA

Yasuhiro Shibata, JAPAN

Qijun Song, CHINA

Bin Song, CHINA

Bin Song, Master, CHINA

Anne Kathrine Belling Sørensen, MD,
DENMARK

Wei Su, CHINA

Ramesh Subramaniam,
MBBS, MRCS(Ed), FRCS(Ed),
SINGAPORE

Xiaofei Sun, MD, CHINA

Yuxin Sun, CHINA

Jie Sun, CHINA

Qi Bin Sun, CHINA

Salami Onimisi Sunday, MBBS,
FWACS, NIGERIA

Yi Tang, CHINA

Xin Tang, CHINA

Srinivasa Rao Tatavarti, MS (Orth),
INDIA

Hai Teng, CHINA

Mengqiang Tian, CHINA

Franklin T. Tran, MD, FRCS(C),
CANADA

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Andres C. Ugalde, COSTA RICA

Benedict Francis Valdecanas, MD,
PHILIPPINES

Harold Vanderschmidt, MD, UNITED ARAB EMIRATES

Peter Verdonk, MD, PhD, BELGIUM

Yongjian Wang, MD, CHINA

Wanchun Wang, CHINA

Shao Jie Wang, CHINA

Tong Li Wang, Master, CHINA

Xiao-Yu Wang, MD, CHINA

Wen Wang, MD, PhD, CHINA

Rui Wang, CHINA

Jianquan Wang, MD, CHINA

Wanglixin Wanglixin, CHINA

Frank Wein, FRANCE

Bei Wu, CHINA

Zi Ying Wu, MD, CHINA

Ji Wu, PhD, MD, CHINA

Hao Bo Wu, CHINA

Xing Xie, Master, CHINA

Jun Xie, MD, CHINA

Zhenzhen Xu, CHINA

Qingyun Xue, CHINA

Liu Yang, PhD, CHINA

Xiao Yang, Master, CHINA

Rui Yang, CHINA

Oi Ning Yang, CHINA

Jianhua Yao, CHINA

Tengbo Yu, MD, CHINA

Yaming Yu, Professor, CHINA

Ben Yuan, MD, CHINA

Jun Yuan, CHINA

Liu Yujie, CHINA

Xiaodong Zhai, CHINA

Keyuan Zhang, CHINA

Yao Nan Zhang, CHINA

Hai Ning Zhang, MD, PhD, CHINA

Chun Li Zhang, MD, CHINA

Yu Zhang, CHINA

Hui Zhang, MD, CHINA

Li Zhao, CHINA

Jinzhong Zhao, CHINA

Lilian Zhao, CHINA

Li Lian Zhao, CHINA

Guo Zheng, CHINA

Minzhe Zheng, CHINA

Peng Zheng, CHINA

Jingbin Zhou, CHINA

Tina Zhu, CHINA

Libo Zhu, CHINA

Libo Zhu, CHINA

Weimin Zhu, MD, CHINA

Weiguo Zhu, CHINA



ISAKOS **Mission Statement**

ISAKOS advances the worldwide exchange and dissemination of education, research and patient care in arthroscopy, knee surgery and orthopaedic sports medicine.

www.isakos.com



MEMBERS

NEW MEMBERS

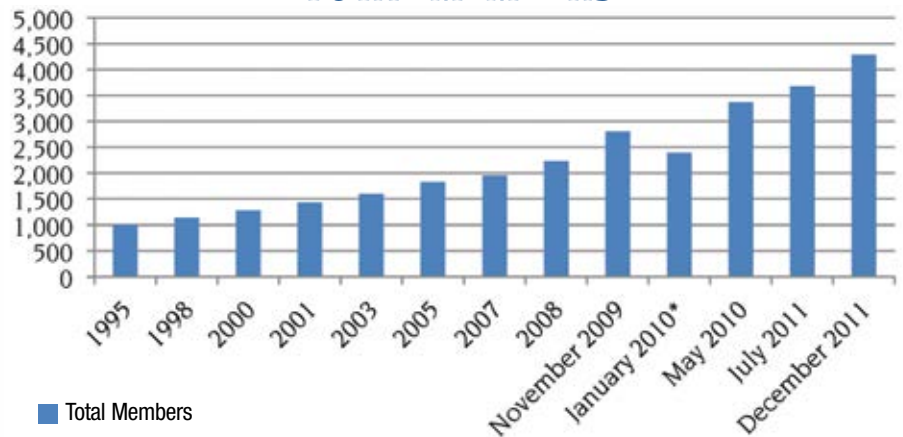
We depend on our members to make the society what it is today and to embrace the potential it has in the future. It is the responsibility of members to recruit NEW MEMBERS to join ISAKOS and its goal to reach across the world.

Download an application online at www.isakos.com or contact the ISAKOS office at +1 (925) 807-1197 for a NEW MEMBER Recruit Packet.

ISAKOS MEMBERSHIP BY CATEGORY

# of Members	Category
1,980	Active
17	Affiliate
52	Applicant
684	Associate
1,327	Corresponding
189	Emeritus
21	Honorary
15	Fellow
4,291	- Total Count -

TOTAL MEMBERS



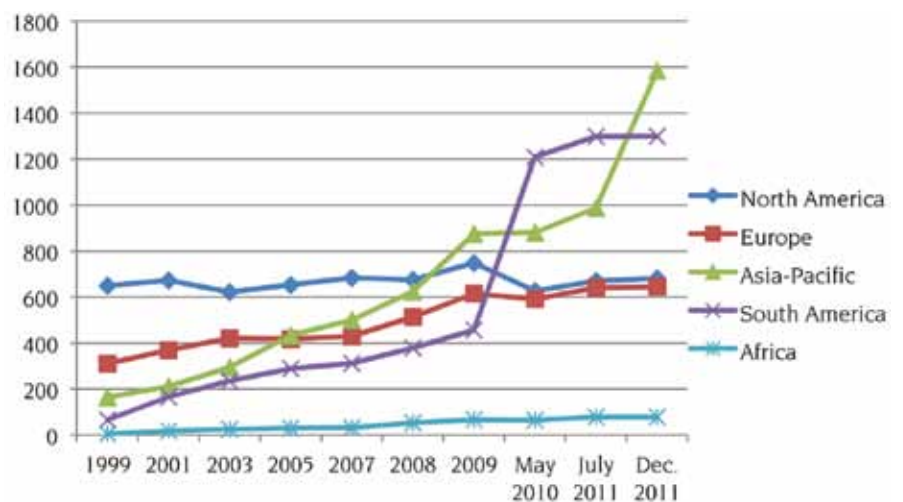
ISAKOS MEMBERSHIP BY GROWTH

Year	Total Members
1995	1,005
1998	1,141
2000	1,282
2001	1,437
2003	1,598
2005	1,828
2007	1,958
2008	2,231
November 2009	2,809
January 2010*	2,396
May 2010	3,374
July 2011	3,677
December 2011	4,291

* ISAKOS frequently suspends members who have failed to pay their ISAKOS Membership Dues.

ISAKOS MEMBERSHIP GROWTH BY REGION 1999 TO DECEMBER 2011

Growth by Region	1999	2001	2003	2005	2007	2008	2009	May 2010	July 2011	Dec. 2011
North America	650	673	622	653	684	675	748	627	671	682
Europe	311	369	421	418	430	514	615	592	640	645
Asia-Pacific	165	211	295	433	500	624	876	881	988	1585
South America	66	166	235	289	312	379	457	1209	1299	1300
Africa	6	18	25	30	32	53	67	65	79	79
TOTAL	1,198	1,437	1,598	1,828	1,958	2,245	2,763	3,374	3,677	4,291





Are you using YOUR ISAKOS Member Benefits?

- Subscription and Online Access to *Arthroscopy: The Journal of Arthroscopic and Related Surgery*
- ISAKOS Newsletter & eNews
- ISAKOS Global Link – Coming Soon!
- ISAKOS International Fellowship & Residency Directory – Applications accepted from Members Only!
- Optional online access to **KSSTA** – the official Journal of ESSKA

ISAKOS Members now receive **FREE** Online Access to **Cartilage**, the official journal of the International Cartilage Repair Society. Free online access will be available until December 2012.

For those members interested in receiving a mailed subscription to **Cartilage**, SAGE Publications is offering ISAKOS members a 20% discount for a total cost of \$158.

Cartilage focuses on both clinical and basic science perspectives of the diverse disciplines in cartilage research and repair. **Cartilage** publishes articles on cartilage biology including repair, development, function, and transplantation. Articles on clinical, laboratory, and therapeutic research are included as well as review articles, editorials, and letters.



ISAKOS STRATEGIC PLAN

The ISAKOS Strategic Plan in Action

On behalf of the ISAKOS Executive Committee – thank you for your membership with ISAKOS! As we begin 2012, the ISAKOS Executive Committee would like to update our membership on how the ISAKOS Strategic Plan, implemented at the 2011 ISAKOS Congress, is being put into action around our Society.

Education:

One of ISAKOS' primary goals has been to increase online education. This effort is reaching a new height with the introduction and opening of the ISAKOS Global Link – ISAKOS online education platform. ISAKOS Global Link is an online access point for ISAKOS materials including Newsletter articles, Congress archives, surgical skills videos and Committee Projects. As we move forward with Global Link, ISAKOS plans to offer online courses and highlight presentations for the use of our membership.

To further ISAKOS' mission to “advance the worldwide exchange and dissemination of education, research and patient care in arthroscopy, knee surgery and orthopaedic sports medicine”, ISAKOS regularly sponsors workshops around the world. For more information on the recently completed ISAKOS Specialty Day in Beijing, and upcoming workshops in Shanghai and Mumbai, please refer to the ISAKOS website (www.isakos.com).

ISAKOS is always looking for ways to improve, and this is especially exemplified in our Teaching Center program. Teaching Centers were recently asked to update their information, including answering additional questions about facilities, specialties, financial support and more. This information will be made available on the ISAKOS website in the coming months, and we hope it will be very helpful to any surgeon looking to expand their skills through continuing education and training.

Membership:

ISAKOS was pleased to introduce the ISAKOS Fellowship and Residency Directory in early 2011, and plans to continue to strengthen this initiative in 2012. The ISAKOS Fellowship and Residency Directory allows ISAKOS Members to register their training programs with ISAKOS for inclusion in an online database. This database will be searchable for any surgeon looking for a Residency or Fellowship Program. Participation in the Registry also gives the fellows and residents in these programs access to a discounted ISAKOS Membership valid until the end of the calendar year following the completion of their Residency or Fellowship.

Research:

In 2012, ISAKOS will embark on a new path to support research through a competitive research grant process. The purpose of the ISAKOS Research Grants Program is to provide ISAKOS members with a major resource for funding the highest quality international research in arthroscopy, knee surgery and orthopaedic sports medicine. Research Grants will be awarded for one year, with the possibility to receive additional funding, pending need and progress reports. All projects must be multi-center research studies involving at least two centers from two continents, and must support the mission of ISAKOS. Applications for ISAKOS Research Grants may be completed online at <http://www.isakos.com/researchgrants/Overview.aspx>

Financial Planning:

ISAKOS is delighted with the progress of the ISAKOS Global Connection Campaign for Education. We have experienced tremendous success thus far and are anticipating meeting our goal of raising \$10 million before the 2013 ISAKOS Congress in Toronto.

If you would like to participate in the ISAKOS Global Connection Campaign, please consider becoming an ISAKOS Godfather. A portion of your Godfather pledge will be allocated toward membership for a deserving individual from a developing region in the world for five years. Through your donation, you will be recognized as a Global Connection Campaign supporter, and specifically as an ISAKOS “Godfather”. Benefits to godfathers are distinct, and include special membership recognition including an invitation to a reception at the 2013 ISAKOS Congresses with the member you support, and an ISAKOS Godfather ribbon. If you are interested in becoming a Godfather, please visit www.isakos.com/campaign to learn more.

On behalf of the ISAKOS Executive Committee, we are thrilled with the progress ISAKOS has made in the years since our inception, and we look forward to many more successes in the years to come.

Thank you,

ISAKOS Executive Committee

Moises Cohen, Brazil, ISAKOS President

Masahiro Kurosaka, Japan, ISAKOS Vice President

Philippe Neyret, France, ISAKOS 2nd Vice President

Luis Vargas, USA, ISAKOS Secretary

Marc Safran, USA, ISAKOS Treasurer

Jon Karlsson, Sweden, ISAKOS Secretary

Willem van der Merwe, South Africa, ISAKOS Assistant Treasurer

Guillermo Arce, Argentina, Consultant

Joao Espregueira-Mendes, Portugal, Consultant

Freddie Fu, USA, Past President



ISAKOS GLOBAL CONNECTION

A Campaign for Education, Research and Collaboration



HOW TO DONATE

Donations may be made through the ISAKOS office,
or via the Campaign website:

WWW.ISAKOS.COM/CAMPAIGN



9TH BIENNIAL

ISAKOS CONGRESS 2013

MAY 12-16, 2013 • TORONTO, CANADA

Message from Program Chair



You are invited to attend the 9th Biennial ISAKOS Congress in Toronto, Canada! The 9th Biennial ISAKOS Congress will be held on May 12-16, 2013 at the Metro Toronto Convention Center. The Biennial Congress is the signature event of ISAKOS providing a forum for international dialogue regarding the practice of arthroscopy, knee surgery and orthopaedic sports medicine. The Program Committee, led by Marc Safran, MD, USA, is working diligently to develop an exciting academic program, emphasizing evidence based medicine, new surgical developments and promising basic science.

The ISAKOS Congress provides a unique opportunity for the exchange of scientific information, as well as networking with leaders and friends in orthopaedics from around the world. We anticipate that the 2013 ISAKOS Congress will draw more than 4,000 international orthopaedic surgeons, allied health personnel, residents and fellows.

The ISAKOS Program Committee has created a program emphasizing evidence based medicine, new surgical developments and promising basic science. The program will include instructional courses, surgical demonstrations, debates, symposia, paper and e-poster presentations, as well as lunchtime lectures and workshops. A geographically diverse and multi-disciplinary faculty will present results from basic research, and the newest operative techniques, highlighting technical pearls and pitfalls.

NEW FOR 2013 ISAKOS CONGRESS! ISAKOS is pleased to announce that three Pre-Courses will be held on Saturday, May 11, 2013. Topics of these pre-courses include *Advances in Knee: Patellofemoral Instability, ACL Reconstruction and Meniscal Repair*, *Clinical Research Methods: From Idea to Publication*, and *Upper Extremity Live Surgical Demonstrations*. For the first time, the Knee and Upper Extremity Pre-Courses will include live surgical demonstrations, in addition to didactic sessions. More information on these pre-courses can be found on the next page.

Additionally, ISAKOS will offer a *Sports Rehabilitation Concurrent Course* for Physical Therapists and Athletic Trainers. This course was offered at the 2011 ISAKOS Congress and was highly successful, as it brought together orthopaedic surgeons with physical therapists and athletic trainers to discuss the effect each individual practitioner has on the successful outcome of the athletic patient. For more information on the *Sports Rehabilitation Concurrent Course*, please refer to page 14 of this Newsletter.

ISAKOS Needs You! We are pleased to announce the Call for Abstracts for the 9th Biennial ISAKOS Congress. Abstracts are currently being accepted for all topics related to the practice of arthroscopy, knee surgery and orthopaedic sports medicine. Presenting authors are invited to visit the ISAKOS website (www.isakos.com/meetings/2013congress) to complete the online abstract submission process. Please note – abstracts will only be accepted through the online submission process. Additionally, submission of an ISAKOS Congress Abstract is required to apply for various ISAKOS Congress Awards. For more information on ISAKOS Awards, please refer to 14–15 of this Newsletter. All Abstracts must be submitted by September 1, 2012 at midnight, Pacific time.

You are a vital part of the 2013 ISAKOS Congress! We encourage you to experience this unparalleled educational event and become part of the international experience that is the ISAKOS Congress. We look forward to seeing you in Toronto in 2013.

Best Regards,

A handwritten signature in black ink that reads "Marc Safran". The signature is written in a cursive, flowing style.

Marc Safran, MD, USA
ISAKOS Congress Program Chairman 2013

Pre-Course Information

Pre-Course Information

All ISAKOS Congress Pre-Courses will be held on Saturday, May 11, 2013. ISAKOS is pleased to offer these Pre-Courses as supplements to the educational experience offered by the ISAKOS Congress. All Pre-Courses will include world-renowned, international faculty, and the high quality of education expected at an ISAKOS Congress.

Additional registration fees will be charged for Pre-Course registrations. For more information, please visit www.isakos.com/meetings/2013congress.

Advances in Knee: Patellofemoral Instability, ACL Reconstruction and Meniscal Repair

Chairs: *Allen Anderson, MD, USA*
Willem van der Merwe, MBChB, FCS, SA Ortho, South Africa
David Parker, FRACS, Australia

The *Advances in Knee* pre-course aims to improve the understanding and treatment of the Knee through a unique combination of didactic sessions and live surgical demonstrations. This pre-course will focus on the diverse topics of Patellofemoral Instability, ACL Reconstruction and Meniscal Repair. This pre-course will encourage presentations with a high level of evidence, debates on controversial subjects, and increased audience participation. This course will include didactic presentations in the morning, and Surgical Demonstrations with Debates in the afternoon. Topics of presentation include Pediatric ACL, ACL Revision, Osteoarthritis, Total Knee Arthroplasty, Acute Dislocation, Recurrent Instability, and MPFL.

Clinical Research Methods: From Idea to Publication

Chairs: *Stephen Lyman, PhD, USA*
Robert Marx, MD, MSc, FRCSC, USA

ISAKOS is proud to present the first Clinical Research Methods pre-course, emphasizing evidence based research methods and analytic techniques. The goal of this pre-course is to provide attendees with the skills necessary to undertake their own high quality research projects. This didactic course will instruct attendees on the process of conceiving a research question, designing a study, analyzing data, and presenting results. Topics of presentation will include Conceiving an Answerable Research Questions, Avoiding Bias in Clinical Research, Evaluating Total Joint Arthroplasty, Coordinating Large Multi-Center Observational Studies, Randomized Clinical Trials, and Basic Principles of Data Analysis and Statistics.

Upper Extremity Live Surgical Demonstrations

Chairs: *Guillermo Arce, MD, Argentina*
Felix "Buddy" Savoie, III, MD, USA

ISAKOS is pleased to offer a surgical skills oriented pre-course on Upper Extremity procedures. The goal of the Upper Extremity Live Surgical Demonstration pre-course is to evaluate the optimal use of diverse techniques for a variety of procedures presented. This half-day pre-course will also help participants to formulate surgical protocols for Upper Extremity procedures that integrate strategies to avoid potential complications. The Upper Extremity Live Surgical Demonstration pre-course is unique in its presentation of surgical techniques, involving demonstrations, as well as pearls and pitfalls, and discussions for each topic. The final procedures are currently being selected, but proposed topics include Rotator Cuff Repair, Latarjet Reconstruction, Shoulder Instability, and Arthroscopic Subscapularis Repair.



9TH BIENNIAL

ISAKOS 2013

MAY 12-16, 2013 • TORONTO, CANADA

Call for Abstracts

ONLINE ABSTRACT SUBMISSION

The International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS) is pleased to announce the Call for Abstracts for the 2013 Congress.

To submit an abstract, visit the 2013 ISAKOS Congress website www.isakos.com/2013congress.



Submit Online at
www.isakos.com/2013congress



Abstract Submission Deadline: September 1, 2012

ISAKOS Sports Rehabilitation Concurrent Course

May 12–14, 2013

ISAKOS is pleased to announce the second ISAKOS Sports Rehabilitation Concurrent Course, to be held during the 2013 ISAKOS Congress in Toronto, Canada on May 12-14, 2013. This course will be held at the Metro Toronto Convention Center.

The ISAKOS Sports Rehabilitation Concurrent Course is intended for physicians, athletic trainers, physiotherapists and coaches concerned with the management or prevention of injuries to the athlete. These topics will be viewed through the international perspective of a diverse and multi-national faculty of orthopaedic surgeons and physical therapists.

Upon completion of this course, participants will be able to:

- Describe current developments in the management of knee, shoulder and elbow, hip, foot and ankle and muscle injuries in athletes
- Better evaluate and manage sideline or onsite issues in sports medicine
- Describe controversial issues concerning return to play in athletic events
- Understand different modalities and treatment strategies utilized in other nations when dealing with similar injuries
- Improve technical knowledge of the athlete's sports return
- Discuss the use and misuse of performance enhancement substances and techniques

The final agenda for this course is currently under development, but anticipated topics of presentation include Biomechanics of Exercise, Effects of Graft Type and Technique on Post-Operative Rehabilitation, Functional Training and Return to Activity, New Treatments for Muscle Injuries, Treatment Options for Tendinopathy, Electrical Stimulation for Rehabilitation of Muscle Injuries, and Anatomy of Major Joints.

Apply Online for 2013 CONGRESS AWARDS & FELLOWSHIPS

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**Achilles Orthopaedic Sports
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**Albert Trillat Young
Investigator's Award**

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**The Upper Extremity
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Concurrent Course



Awards

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ISAKOS Awards

The ISAKOS Fellowship and Awards Program is committed to recognizing and honoring researchers whose work has contributed to better understanding and communication within the fields of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine.

Applicants, please note: Presenting authors are allowed one submission per award. Additionally, each abstract may only be applied to one of the following awards. To be considered for an Award or Fellowship, abstracts and award applications must be submitted before September 1st, 2012.

John J. Joyce Award

Sponsored by Smith & Nephew Inc.

In 1981, Dr. John J. Joyce III, offered a monetary prize for the best arthroscopy paper read by an orthopaedic surgery resident during the Scientific Program of the 4th Congress of the International Arthroscopy Association in Rio de Janeiro. With characteristic generosity, he endowed a prize to be awarded at every IAA Congress thereafter. John Joyce created the award with the intention to stimulate and reward younger members who contribute high-quality data and presentations. Thus, orthopaedic residents and fellows, with a study related to arthroscopic treatment are encouraged to apply for this award.

Richard B. Caspari Award

Sponsored by DePuy Mitek

Richard B. Caspari was an innovator, teacher and leader in the field of Arthroscopy. Beginning at the 2003 ISAKOS Congress in Auckland, New Zealand, a monetary prize in honor of Richard B. Caspari was awarded to the best upper extremity paper read at the scientific program of the Congress. The Richard B. Caspari Award was established with the intention of stimulating and rewarding abstracts and presentations in the subject of the upper extremity.

Scientific Research Award

The Scientific Research Award began at the 2007 ISAKOS Congress in Florence, Italy. There, a monetary prize was awarded to the best scientific paper read at the scientific program of the Congress. The Scientific Research Award was created with the intention to stimulate and reward abstracts and presentations in the subject of Scientific Research.



Fellowships

Albert Trillat Young Investigator's Award

Sponsored by Stryker

In 1989, The International Society of the Knee established a Young Investigator's Research Award in memory of Professor Albert Trillat. Past president and founder of the International Society of the Knee, Professor Albert Trillat was one of the pioneers in knee surgery and sports traumatology. This award provides recognition for a young researcher who has done outstanding clinical laboratory research contributing to the understanding, care or prevention of injuries to the knee.

Achilles Orthopaedic Sports Medicine Research Award

Sponsored by DJO, Inc.

The Achilles Orthopaedic Sports Medicine Research Award was created to recognize the researchers(s) who have performed the most outstanding clinical or laboratory research in the field of sports medicine, such as the care and prevention of injuries.

Patellofemoral Research Excellence Award

Sponsored by The Patellofemoral Foundation, Inc.

The Patellofemoral Research Excellence award was conceived in 2005 by the Board of Directors of the Patellofemoral Foundation and ISAKOS President John Bergfeld to encourage research and expertise in the field of patellofemoral disorders. The Patellofemoral Research Excellence Award was established to encourage outstanding research leading to improved understanding, prevention and treatment of patellofemoral pain or instability.

ISAKOS Fellowships

The Patellofemoral Traveling Fellowship

Sponsored by the Patellofemoral Foundation, Inc. and DJO Inc.

The Patellofemoral Traveling Fellowship was conceived in 2005 by the Board of Directors of the Patellofemoral Foundation and ISAKOS President John Bergfeld. The Patellofemoral Traveling Fellowship is available on a competitive basis to an orthopaedic surgeon interested in the study and advancement of understanding of the patellofemoral joint. The purpose of the fellowship is to promote better understanding and communication around the world regarding patellofemoral pain.

The Upper Extremity Traveling Fellowship

This fellowship was developed by the ISAKOS Upper Extremity Committee to promote better understanding and communication regarding injuries or conditions involving the structures of the Upper Extremity. This Traveling Fellowship is available on a competitive basis to an orthopaedic surgeon interested in the study and advancement of understanding of the Upper Extremity.





Welcoming ISAKOS To Toronto: The City Is A Poem



**Kivanc Atesok MD Daniel Whelan MD
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Toronto is the largest city in Canada and lies on the shore of Lake Ontario, the easternmost of the Great Lakes¹. Home to more than 2.7 million people, it is the fifth most populous city in North America. Over 5 million Canadians live in the Greater Toronto Area which is the metropolitan district of Toronto. Toronto is one of the world's most ethnically-diverse cities; about 49% of the population was born outside of Canada, and represent more than 80 different ethnicities.

A relatively modern city, Toronto's history dates back to the late-18th century, when its land was first purchased by the British monarchy. The settlement was later established as the Town of York and proclaimed as the new capital of Upper Canada. In 1834, the Town of York became the City of Toronto.

Toronto is the provincial capital of Ontario and the cultural, entertainment, and financial capital of the nation. Toronto is also consistently rated as one of the world's most livable cities by the Economist Intelligence Unit and the Mercer Quality of Living Survey. According to Forbes, Toronto is the tenth-most economically powerful city in the world and one of the fastest growing among the G7 nations.

Toronto is the home of famous professional sports teams including Blue Jays in baseball, Toronto Raptors in NBA, and Maple Leafs in hockey. Toronto has the the third largest English-speaking theatre district in the world, behind New York and London². The city's excellent public transportation system makes navigating Toronto easy and convenient. Its breathtaking architecture, world-class theater, and beautiful waterfront setting make this a popular city to visit, to study, and to live in³.

¹ Toronto view from Lake Ontario.

elcome



² Princess of Wales Theatre is a 2000-seat theatre in the heart of Toronto's Entertainment District in the downtown area.



³ Toronto view at night from Lake Ontario.



⁴ Autumn in Toronto.



⁵ Scene of Niagara Falls, Canada.



⁶ Directors of ISAKOS approved sports medicine and arthroscopy fellowship program at the University of Toronto, Division of Orthopaedic Surgery: Dr. John Theodoropoulos (right) and Dr. Daniel Whelan (left).

Toronto is a great choice if you like the excitement of a big city. It is well-known for its nightlife, music festivals, great shopping and restaurants. The beauty of the city inspires poets and one can easily discover the romantic side of Toronto⁴. Beautiful Toronto Islands are only fifteen minutes from the heart of the city where you find yourself in another world, a green and watery place that, even when flocked by thousands, still seems somehow secret. A sense of apartness is what gives the islands their magic. The Canadian side of the Niagara Falls, one of the world's natural wonders, is just 2 hours drive from Toronto⁵.

Established in 1827, the University of Toronto is Canada's largest university, with more than 20,000 staff and faculty members and almost 70,000 students. According to the Times Higher Education Supplement, 2009, the University of Toronto is one of five universities world-wide ranked in the top 15 for all fields.

The University of Toronto Division of Orthopaedic Surgery is one of the leading orthopaedic training centres in North America. There are eight hospitals which have faculty members affiliated with the University of Toronto Division of Orthopaedic Surgery: The Hospital for Sick Children, St. Michael's Hospital, Toronto Western Hospital, University Health Network, Sunnybrook Health Sciences Centre, Toronto East General Hospital, Mount Sinai Hospital, and Women's College Hospital. There are over 60 residents and 70 fellows enrolled in postgraduate and subspecialty programs in orthopaedics respectively.

Dr. John Theodoropoulos and Dr. Daniel Whelan are the directors of the only ISAKOS approved Teaching Centers in Toronto, with a focus on sports medicine and arthroscopy fellowship training⁶. They offer a worthwhile training to both national and international fellows in knee and hip arthroscopy, management of sports injuries, clinical and basic research. Drs. Theodoropoulos and Whelan's ISAKOS fellows will have the opportunity to gain comprehensive experience while working at the three biggest hospitals affiliated with the University of Toronto; Mount Sinai Hospital, St. Michael's Hospital and Women's College Hospital in a friendly, supportive and scientific environment.

These are exciting times for sport medicine and arthroscopy, and we have been given the privilege to host the largest sports medicine, arthroscopy and knee surgery society of the world, ISAKOS, in 2013. We wholeheartedly and zestfully welcome the 9th Biennial ISAKOS Congress to Toronto.

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**TO THE MEMORY OF
ROBERT W. JACKSON:
A TORONTONIAN WHO BROUGHT ARTHROSCOPY TO NORTH AMERICA...**

References: 1. Official website for the City of Toronto. www.toronto.ca/ 2. Wikipedia website. <http://en.wikipedia.org/wiki/Toronto> 3. The Globe and Mail. September 8th, 2011.

Travel

Information related to Congress Hotels will be available on the ISAKOS Congress website on June 1, 2012. Please visit the 9th Biennial ISAKOS Congress website for updated information on all things Congress-related at www.isakos.com/meetings/2013congress



About Toronto

Toronto is one of the most cosmopolitan cities in the world; a place where international ideas intersect with Canadian culture. A centre of rare openness, warmth, energy and style, Toronto is enriched by the fusion of traditions, passions and perspectives of the more than 100 cultures found within the city.

A city of contrasts, Toronto's skyline includes the CN Tower, one of the Modern Wonders of the World, and glass skyscrapers juxtaposed with historic limestone facades. Miles of waterfront, boardwalks, parks and trails nestle together with urban delights like cafés, artisans' exhibits and one-of-a-kind shops.

Beyond the city limits are breathtaking attractions within charming countryside. Experience the wonder of Niagara Falls, a renowned wine region, outstanding theatres and outdoor adventures—all within a short drive.

Multiculturalism is reflected in the food most of all—from street food to white linen dining—innovation and fusion are the watch words in Toronto tastes. With over 7,000 restaurants dishing out anything one's stomach desires, it's hard to go hungry here.

Shoppers delight in trendy Queen Street West, Yorkville's designer boutiques, fabulous malls like the Toronto Eaton Centre and Vaughan Mills and the PATH, which features more than 1,200 shops in over 16 miles of underground concourses.

The 2013 ISAKOS Congress will be held at the Metro Toronto Convention Centre, Canada's #1 convention and trade show facility. The Centre is located in the heart of downtown Toronto, within walking distance of over many hotels, shopping, restaurants and Toronto sites and only a 20 minute drive from Lester B. Pearson International Airport.

Metro Toronto Convention Centre
255 Front St. W.
Toronto, Ontario
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www.mtccc.com



Travel

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Side to side capsular plication in shoulder Instability

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Introduction

Capsular Redundancy is one of the key factors to correct in Shoulder Instability. There are several causes of this issue. We can think that is a quantity or quality problem or both. If we think in quantity we are talking of a larger healthy capsule volume. As we know there are some type of congenital recesses between Middle an Inferior Glenoid Ligament or atraumatic low capsular attachment in the glenoid neck, or simple congenital capsular redundancy, that may help inducing shoulder instability. If tissue is normal, capsular shortening is philosophically sound, but if capsular volume augmentation is by result of localized or generalized tissue intersticiopathy capsular shortening is not so sound philosophically even so we normally use it. We may guess that in this cases some degree of capsular improving by mean of folding or allografting in extreme cases may be more logical as a solution, as we improve a decreased capsular quality. In this way of thinking, open repair had some advantages because it is done by way of capsular flap imbrication as in normal capsular shift even that the shape and types of shifts varies, by doing so capsule is no only shortened but is also thickened by flap imbrication. Capsular tightening in the arthroscopic Literature is mainly done indirect via labral tensioning or matressing labrum and capsule, or via an arthroscopic capsulotomy or relies in a 270 repair. The biggest part of the techniques reported are mainly circumferential capsular shortening. More recently Denard published a split subscapularis flap for this same issue and is one of few ones that talks about capsular failure and a way of augmenting capsular thickness in cases of capsular damage.

We have been using in hiperlax patients also in cases of middle capsular recesses as between middle an inferior ligament or extensive tissue damage, or in merely redundant capsule as a complement for capsular shortening, side to side stitching medial to lateral, superior to inferior as a way to fold the capsule thus increasing its strength and of course an alternative way to capsular shortening.

Technique

We will describe the technique as it is done in lateral decubitus and if it was a right shoulder for orientation. We perform a regular posterior portal and use an anterior cannula straight superior to the subscapularis as a working portal. After careful examination if we carefully asses anteroinferior capsular redundancy or see capsular failure as in a revision we determined the zone to perform the procedure. It can be done by several different instruments, we normally use an Arthrex Suture lasso.

First taking as far lateral as we can a superior bite (left in photo 1)then passing again more or less one cm below an inferior bite (photo 2) and retrieving the inside wire via a suture grasper passed through a posteroinferior stab portal, this portal is made superior to the posteroinferior glena its only a small incision just to let a regular suture grasper pass through the skin (photo 3 A and B)picking the wire and loading a fiberwire in it, returning inside the joint and then retrieving suture end and tying on the anterior portal (photo 4). Proceeding lateral to medial with same procedure reaching Glena level, usually 3 stitches are used. One of them is left long and taken outside cannula to be used to rise up capsule if needed during anchor and suture placing in low Glena (photo 5)also we can use an anchor near medial stitch taking both sides of folded capsule and securing it to bone as we do in side to side rotator cuff repair. Of course there are several ways and instruments to perform this but the idea stays on performing a capsular fringe right in the middle were it is needed. We have done this in the Anterior, Inferior or Posterior capsule

Discussion

Capsular redundancy is usually treated arthroscopically by circumferential glenoid shortening in many different ways 270 repair capsulolabral matressing capsulotomy multipteated

This is not the way that this issue is solved in open repairs (capsular shift).The discussion between open and arthroscopic plication surgeries has been focused mainly in how much capsular volume is decreased due to the shape an place of capsular plication, but not if capsular thickening via flap imbrication could be better or not(a quality issue).

Arthroscopic side to side capsular folding is a different way to increase width and decrease volume that we can combine with regular bankart repair or capsular shortening techniques. We have been performing this since 2001. It is of course difficult to probe if it is statistically sound because it is used as needed sometimes alone sometimes combined and having comparable groups have been difficult for us



Photo 1 Passing through capsule with a suture lasso (superior side)



Photo 3b Posteroinferior portal for wire grasping and suture passing.

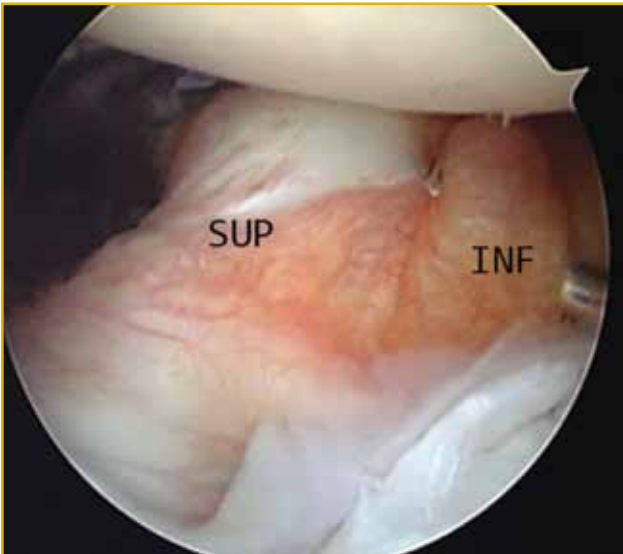


Photo 2 Taking Both capsular sides with a suture lasso

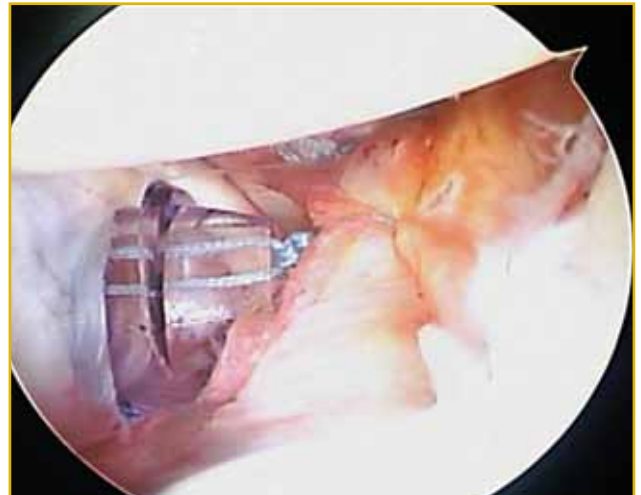


Photo 4 Knot tying through anterior cannula



Photo 3 Taking the inside wire of the suture lasso a) via a posteroinferior stab portal



Photo 5 Final View of capsular folding with 3 stitches Number 3 is left long outside the cannula to use it as a traction suture to raise the capsule.

Evaluating the MCL of the Knee in Soccer Players



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Introduction

The medial collateral ligament is one of the most commonly injured ligaments of the knee. These injuries frequently result from a valgus force on the knee from direct contact or with cutting maneuvers when an athlete plants his/her foot and then forcefully shifts directions. The high popularity of soccer, in Brazil, contributes to the increased frequency of MCL injuries.

The treatment of medial-sided knee injuries is mainly non-operative. The surgery is reserved for chronic MCL deficiency that failed non-operative treatment or more severe, complex injuries that includes the associated/combined lesions. We will review the clinical evaluation and treatment proposed for the soccer players that have had these injuries.

Clinical Exam

First of all, we need to collect some information about the history, asking about the mechanism of trauma, pain location, sensation of tear and if the patient could continue playing or had to quit. The clinical exam starts with the inspection. We need to observe the patient's walk, presence of ecchymosis, hemarthrosis, swell, scars and muscle trophism.

The next step is the palpation of the anatomic points of the knee, searching for the pain spot.

Analyzing specifically the MCL, the patient should be relaxed and the contralateral leg is used as a control. A valgus force is applied to the leg with the knee in 30° of flexion thereby isolating the MCL. After placing the knee into full extension a valgus force is repeated. Increased medial joint space opening indicates additional pivot ligament (ACL or PCL) injury.

My preferred physical exam is to keep the patient on the prone position, with a relaxed limb. I hold, firmly the distal thigh, right above the patella in order to prevent it from rotating and firmly hold the patients great toe. I ask the patient to relax as I externally rotate the whole foot from the great toe. A positive test for MCL injury is considered when the patient refers sharp pain on the femoral insertional site of the MCL. This new test is equal to the positive pain referred by an athlete after kicking the ball with the medial aspect of the great toe (Figures 1,2 and 3)



Figure 1 – My preferred MCL test, a painful MCL.



Figure 2– My preferred MCL test.



Figure 3—My preferred MCL test

Radiologic Study

The MRI is the most useful exam for evaluating the MCL. It permits to assess lesion location, grade, and other concomitant injuries of the knee such as ACL tear or medial meniscus tear. The presence of a bony avulsions or osteochondral fragments can significantly change the treatment plan.

Classification

MCL injuries are classified as grade I - tears that involve a few fibers of the MCL with localized tenderness (opening: 0–5 mm). Grade II - injuries include disruption of more fibers with generalized tenderness (valgus opening: 5–10 mm). Grade III - injuries are complete MCL tears with resultant medial joint laxity to valgus stress (>10 mm opening).

Treating the Soccer Player

Acute isolated MCL injuries

Most injuries, regardless of their graduation, are initially treated conservatively. Our treatment protocol includes the use of crutches during the period of acute pain, progressively releasing the weight bearing as tolerated, providing that the athlete can walk without limping. We recommend the use of anti-inflammatory, cryotherapy, compression, elevation, rest and early physiotherapy. We do not recommend the use of immobilizers / braces seeking to gain early range of motion, which promotes ligament healing.

On the final phase of the treatment the athlete is encouraged to kick a soft soccer ball with the inner part of the foot and a straight leg, against the wall. (Figure 4)



Figure 4 – kicking the ball with extended knee

He or she should progress with the hardness of the ball and the number of repetitions as the pain permits. Accordingly to patients progression he or she will be able to kick the ball with the inner part of the foot and a relaxed and flexed to 30° knee by 3 weeks of treatment (Figure 5)



Figure 5 – Kicking the ball with flexed knee

As for the treatment of every athlete, he or she should be kept during the whole treatment exercising the uninvolved limbs and doing aerobics as the pain permits.

A functional progression and return to play protocol should be discussed with the Doctor, Physiotherapist (Figure 6) and Athletic Trainer.



Figure 6 – The physiotherapy program.

Summary

The MCL injuries are extremely common in our environment, so the patient /athlete in rehab requires a quick and safe return to the practice field. Physical therapy is crucial in this process, since in most cases management is conservative. We must always be alert to possible presence of associated lesions, which can completely change the course of treatment.

Full article and references also available online at www.isakos.com.

Scaffold-Based Repair For Cartilage Healing: A Systematic Review

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Purpose

The aim of this systematic review was to address the treatment of chondral and osteochondral knee lesions through the use of scaffolds, by showing surgical options and results of this scaffold-based repair approach for the healing of the articular surfaces.

Methods

All studies published in the English language addressing cartilage scaffold-based treatment were identified, including those that fulfilled the following criteria: 1) level I-IV evidence addressing the areas of interest outlined above, 2) measures of functional or clinical outcome, 3) outcome related to knee cartilage lesions, 4) minimum 2 years of follow-up.

Results

The analysis of the literature showed a progressively increasing number of articles per year from 1995 to 2011. The number of selected articles was 34, 27 of those focusing on two-step procedures and seven on one-step procedures. The evaluation of evidence level showed only one randomized study, seven comparative studies, 21 case series and five case reports.

Conclusions

Regenerative scaffold-based procedures are emerging as a potential therapeutic option for the treatment of chondral lesions, but well-designed studies are lacking. Systematic long-term evaluation of these techniques and randomized controlled studies are necessary to confirm the potential of this treatment approach, especially compared to the available traditional treatments. Different one-step scaffold-based strategies are emerging to simplify the procedure, broaden the indications and further improve the results.

Introduction

Numerous surgical approaches have been proposed over the years to treat chondral or osteochondral lesions, but the properties of the healthy cartilage tissue are still unmatched by any available treatment. In fact, the complex biomechanical feature of hyaline cartilage is difficult to replace or reproduce. An articular chondral surface has a peculiar ultrastructure, with chondrocytes sparsely distributed and minimal cell-to-cell contact, interacting in a surrounding matrix characterized by a complex collagen, aggrecan and fluid framework.

Treatment options aimed at the recruitment of potential cartilage precursors allowing stem cell migration from the marrow cavity to the fibrin clot of the defect, such as abrasion, drilling and microfracture, produce predominantly type I collagen, fibrocytes and an unorganized matrix. This fibrous repair tissue lacks proper biomechanical and viscoelastic characteristics and leads to not durable results. Techniques aiming to transfer autologous osteochondral units from less weight-bearing areas to repair the lesion with a healthy tissue allow a valid articular surface to be reconstructed with a good defect coverage and graft stability only in small lesions. Donor site availability and technical difficulties are critical aspects that limit this approach for medium-large surfaces. A valid alternative option is the use of homologous osteochondral grafts, but some concerns remain regarding low availability, difficulties to preserve and manage fresh allografts, and the risk of disease transmission, thus reducing the indication of this procedure to large osteochondral lesions in young patients with high functional requirements, otherwise doomed to poor clinical outcome.

Regenerative procedures aim to recreate a hyaline-like tissue to restore as similar an articular surface as possible, biologically and biomechanically, to the physiological one, and overcome the limits of the other available treatment options.

The pioneers of this ambitious treatment approach developed and introduced the Autologous Chondrocyte Implantation (ACI) technique in 1987 in Sweden, showing first in 1994 satisfactory results treating isolated femoral condyle lesions. Several studies followed and claimed both the production of a hyaline-like articular surface and a good outcome at medium-long follow-up, but the good results had to be weighed against several problems. From a surgical point of view, the standard ACI procedure presents various limitations related to the complexity and morbidity of the technique, including the difficulty in handling a delicate liquid suspension of chondrocytes, the need to make a hermetic periosteum seal using sutures, the requirement of a second open surgery operation, with subsequent very long rehabilitation period and high rate of complications and further surgery due to flap hypertrophy, arthrofibrosis and joint stiffness. From a biological point of view, critical aspects are the maintenance of the chondrocyte phenotype during the prolonged monolayer culture and the risk of a not homogeneous distribution of the liquid cell suspension in the three dimensional lesion site.

Scaffolds have been studied to address most of these problems, and the development of tissue engineering led to the introduction into clinical practice one decade ago of the so-called Matrix-assisted Autologous Chondrocyte Transplantation procedures.

The aim of this systematic review was to address the treatment of chondral and osteochondral knee lesions by the use of scaffolds, and show surgical options and results of this scaffold-based repair approach for healing of the articular surface.

Methods

All studies published in the English language addressing cartilage scaffold-based treatment were identified. Two independent reviewers performed a search of the Medline database on PubMed from 1995 to May 2011, using the terms "Autologous Chondrocyte Transplantation", "Second /Third generation ACI", "Matrix-assisted Chondrocyte Implantation", "cartilage regeneration", "scaffold-based repair", and "osteochondral repair". Studies were included in our systematic review if they fulfilled the following criteria: 1) level I-IV evidence addressing the areas of interest outlined above, 2) measures of functional or clinical outcome, 3) outcome related to knee cartilage lesions, 4) minimum 2 years of follow-up. Citations from relevant studies, as well as any relevant articles captured by the search, were also examined to determine if they were suitable for inclusion. Studies not fulfilling these criteria were excluded.

Results

The PubMed search identified 158 articles referring to in vitro studies, 182 articles referring to animal studies, and 89 articles referring to clinical studies. The number of articles per year increased progressively from 1995 to 2010, as reported in detail in figure 1. Among the clinical studies, excluding those not fulfilling the inclusion criteria, the number of selected articles was 34, 27 of which focusing on two-step procedures and 7 on one-step procedures (tables 1 and 2). The evaluation of evidence level showed only 1 randomized study, 7 comparative studies, 21 case series, and 5 case reports.

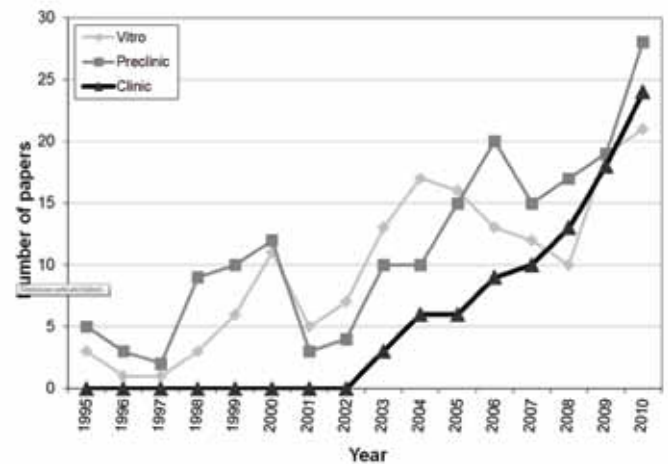


Figure 1

Scaffold-Based Repair

The rationale of using a scaffold is to have a temporary three-dimensional structure of biodegradable polymers for the in vitro growth of living cells and their subsequent implantation into the lesion area. An ideal scaffold should mimic biology, architecture and structural properties of the native tissue, thus facilitating cell infiltration, attachment, proliferation, and differentiation. Other important properties include biocompatibility and biodegradability through safe biochemical pathways at suitable time intervals to support the first phases of tissue formation and gradually be replaced by the regenerating tissue.

The introduction of tissue-engineering technology into clinical practice allowed most of the concerns related to the cell culture and its surgical application to be addressed. Three-dimensional scaffolds showed that they favour the maintenance of the differentiated chondrocyte phenotype, and promote a more homogeneous distribution and avoiding the risk of chondrocyte leakage. This also implies surgical advantages. The long, tedious and sometimes difficult watertight suture required when implanting a liquid cell suspension and the subsequent large joint exposure can be avoided.

Scaffold-Based Repair For Cartilage Healing: A Systematic Review (cont.)

There is no need for a second incision for harvesting the periosteal patch, and the easy handling of the bioengineered tissue allowed the use of minimally invasive surgical approaches. For some scaffolds even arthroscopic techniques have been developed, with lower surgical trauma and mechanoreceptor disruption, thus reducing the surgical morbidity and enabling a faster functional recovery.

Several scaffolds have been developed and applied to tissue engineering in recent years in the attempt to fulfil better the requirements of cartilage regeneration process, with substantial differences regarding the materials chosen and their physical forms (fibers, meshes, gels). Solid scaffolds provide a substrate that cells can adhere to, whereas gel scaffolds physically entrap the cells. Materials used to form these three-dimensional structures vary widely, ranging from scaffolds based on components of the cartilage matrix to synthetic matrices. Polylactides, including polylactic acid (PLA) and polyglycolic (PGA) acids, are commonly used synthetic matrices. Mechanical properties and degradation of synthetic biomaterials are more easily modified than those of natural polymers. Some concerns might be raised by their degradation products and their effect on native tissue and implanted cells, but innovations in the chemistry of these materials have improved their biocharacteristics and biocompatibility. Natural materials include hyaluronic acid, collagen derivatives, agarose, alginate, fibrin glue, and chitosan. They have good biocompatibility, enhance cell proliferation and are processed in a reliable and reproducible way.

In the USA, the FDA has not yet approved matrix-assisted chondrocyte transplantation for human applications, but different alternative solutions are being developed, avoiding manipulation of cells and their regulatory obstacles. In fact, there is an increasing awareness that the role of scaffolds is not only to deliver cells to enhance tissue regeneration, and the use of cell-free scaffolds has been proposed and is gaining popularity. In fact, some scaffolds may have a potential themselves to promote chondral or osteochondral regeneration by exploiting the self-regenerative potential of the body.

Finally, whereas most of the available chondral scaffolds are monophasic, being composed of a unique kind of material, some new products are biphasic: the bilayer structure allows the entire osteochondral unit to be treated, which is important in particular in case of large chondral or osteochondral articular defects, reproducing the different biological and functional requirements for guiding the growth of both bone and cartilage tissues.

Two-Step Procedures

Matrixes firstly introduced into clinical practice were collagen or hyaluronic acid-based. These materials, indeed, are already components of mature hyaline cartilage, thus being able to integrate easily, and have been extensively used in the autologous chondrocyte transplantation techniques for more than a decade.

The first autologous chondrocyte transplantation using a porcine collagen type I/III membrane (Chondro-Gide, Geistlich Biomaterials, Switzerland) was performed in 1998. The surgical technique, as every two surgical steps: harvesting articular cartilage from a non-weight-bearing area and, after culturing cells for 4 weeks and then seeding and culturing with autologous serum for the remaining 3 days on the rough side of the porcine collagen matrix, arthrotomic implantation of the bioengineered tissue into the defect (MACT, MACI[®], Verigen Transplantation Service, Copenhagen, Denmark). In 2006 Behrens et al. published a 5-year prospective study, reporting that 8 out of 11 patients rated the function of their knee as much better or better than before. In the same year Ronga et al. reported the successful treatment at 2 year's follow-up of a complex knee ligament, meniscal and chondral lesion in a 40-year-old sportsman. Normal joint biomechanics was restored by performing a collagen meniscus implant and anterior cruciate ligament reconstruction during the first step, and after 6 months a 5-cm chondral lesion was treated with the second-step MACI[®] procedure. More recently, Salzmann et al. confirmed these good results in a comparative study: 9 patients obtained a significant clinical improvement with results higher than those obtained in a matching group of patients who underwent osteochondral autograft transplantation.

Hyaluronic acid, another widely represented component of the cartilage matrix, is the main component of Hyalograft C[®], introduced into clinical practice in 1999 for the treatment of full-thickness cartilage defects. This scaffold is entirely based on the benzylic ester of hyaluronic acid (HYAFF[®], Fidia Advanced Biopolymers Laboratories, Padova, Italy) and consists of a network of 20- μ m-thick fibers with interstices of variable sizes. The cells harvested from the patient are expanded and then seeded onto the scaffold to make the tissue-engineered product Hyalograft C[®]. The features of this device have also permitted the development of an arthroscopic surgical technique, and in 2005 Marcacci et al. reported the clinical results of a multicenter study on 141 patients evaluated at a minimum 2 years' follow-up.

At the mean 3-year evaluation 91.5% of patients improved, and cartilage repair was graded arthroscopically as normal or nearly normal in 96.4% of the scored knees. Moreover, the majority of the second-look biopsies were judged as hyaline-like, and a very limited complication rate was recorded. In the same period, Nehrer et al. confirmed the good short-term results in a group of 36 patients followed-up to 3 years, and Gobbi et al. reported a positive outcome at 2 years also treating 32 patellofemoral full-thickness chondral defects. The same author followed-up the same group of patients at 5 years and showed a worsening with respect to the previous study, but still good clinical and histological results. A medium-term follow-up evaluation was also performed by Marcacci et al. and Nehrer et al. who confirmed the significant clinical improvement with stable results over time. Ferruzzi et al. treated 50 patients affected by OCD and traumatic lesions and showed stable clinical results at minimum 5 years' follow-up and a well-integrated cartilage tissue in 93% of the patients at the final MRI follow-up. Moreover, they also compared them with a group of patients treated with first generation ACI and showed a similar healing potential but with fewer complications and a more rapid recovery when the arthroscopic MACT procedure was used. Kon et al. followed a group of patients both clinically and with MRI for five years and reported durability of the good clinical results obtained and a correlation between imaging and clinical findings, and in another comparative study they also reported good stable results in 40 patients treated with Hyalograft C[®] at 5 years' follow-up, conversely to the microfracture comparative group, where a deterioration was observed over-time. Della Villa et al. focused on the evaluation of the post-operative phase by evaluating highly competitive athletes, and demonstrated that an intensive rehabilitation may allow safely a faster return to competition and also positively influences the clinical outcome at medium-term follow-up. Clar et al. reported the use of hyaluronic-based MACT for the salvage treatment of a 14-cm defect in a 17.5-year-old girl, due to a previous steroid-induced osteonecrosis, with a solid cartilage layer revealed by MRI and a continuous clinical improvement up to 5.5 years follow-up. Finally, recently Kon et al. analyzed and compared results obtained using arthroscopic Hyalograft C[®] implantation or the mini-open MACI[®] technique for the treatment of cartilage lesions in 61 patients over 40 years old with no clear signs of osteoarthritis. Results were inferior with respect to those previously found for younger populations, and the failure rate was also higher, but a significant clinical improvement was found at 5 years. In fact, this group of patients also benefited in most cases from both cartilage regenerative procedures, with the only difference being a faster recovery when the arthroscopic approach was used.

Among synthetic scaffolds, Bioseed C[®] (BioTissue Technologies), composed of fibrin, polyglycolic/polylactic acid and polydioxanone, is one of the most widely used: it is a cartilage tissue-engineered graft that combines autologous chondrocytes, embedded in fibrin, with the tissue development-promoting properties of 2-mm thick porous gel-like matrix in an initially mechanically stable bioresorbable polymer scaffold, and has been applied in clinical practice since 2001. This biomaterial differs from the others in the type of fixation whereas the surgical procedure can be performed arthrotomically or arthroscopically, depending on the location and size of the defects. After careful debridement of the defective cartilage to a rectangular shape, the graft is fitted to the size of the defect and a strong fixation is obtained by arming the corners with resorbable threads, anchored transosseously to each corner. This technique ensures secure fixation of the graft even in defects without intact surrounding cartilage, and offers high endpoint fixation strength. Ossendorf et al. in 2007 reported 2 years of clinical results in a group of 40 patients affected by degenerative defects, and showed good integration of the graft, formation of a cartilaginous repair tissue and a significant clinical improvement even in the more challenging osteoarthritic lesions. Kreuz et al. then confirmed the good results obtained in 19 patients of the same group analyzed at 4 years of follow-up, and a further evaluation of 52 patients also showed clinical improvement and moderate-to-complete filling at the MRI in the majority of the patients, even if a persisting strength deficit was found in the treated knee.

Finally, a similar significant improvement to that achieved with the original ACI periosteum-cover technique was found independently by Erggelet et al. in a retrospective comparative study and by Zeifang et al. in a randomized clinical trial.

More recently, among the many scaffolds developed, a few other biomaterials have been introduced into clinical practice with a minimum follow-up of 2 years.

NeoCart (Histogenics Corporation, Waltham, Massachusetts) partners a 3-dimensional type I collagen scaffold seeded with autologous chondrocytes with a tissue engineered protocol that includes treatment with a bioreactor. The resulting product is a viable proteoglycan- and glycosaminoglycan-rich tissue-like implant, which is surgically fixed to the damaged area with CT3 bioadhesive (Histogenics). Crawford et al. reported 8 patients with good clinical outcome at 2 years of follow-up and imaging findings indicating implant integration, defect fill, as well as progressive maturation and more organized cartilage formation.

Table 1.

Product	Scientific Publication	Type of study	N° Patient	Lesion Size	Follow-up	Results
MACI	Behrens P Knee 2006	Case series	11	1.5-17.7 cm ²	5 y	81.8% normal or nearly normal knees 8/11 improved significantly
	Ronga M Arthroscopy 2006	Case report	1	5 cm ²	2 y	Clinical improvement in all knee scores Hyaline-like signal at MRI
	Salzmann GM Osteoarthritis and Cartilage 2009	Comparative study	9 OCT 9 MACT	2.3 cm ² 6.3 cm ²	41 m 42 m	Clinical outcome higher for MACI No clinical MRI results correlation
Hyalograft C	Marcacci M Clin Orth Relat Res 2005	Case series	141	3.5 cm ²	38 m	95.7% good or excellent results 91.5% patients improved
	Nehrer S Eur J Radiol 2006	Case series	36	1.5-8 cm ²	3 y	Significant improved at 1 year in all scores Continued improvements at 2, 3 y
	Gobbi A Am J Sport Med 2006	Case series	32	4.7 cm ²	2 y	MRI showed normal cartilage (71%) with positive correlation to clinical outcome 90.7% normal or nearly normal knees
	Marcacci M Knee Surg Sports Traumatol Arthrosc 2007	Case series	70	2.4 cm ²	2-4 y	Significant improvement in all scores at 2 y Maintained at 3 y and 4 y
	Ferruzzi A J Bone Joint Surg Am 2008	Comparative study	48 ACI I gen 50 Hyalograft C	6.4 cm ² 5.9 cm ²	5 y	Similar results at 5 y Faster recovery with arthroscopic Hyalograft C
	Kon E Am J Sport Med 2009	Comparative study	40 Hyalograft C 40 Microfractures	2.2 cm ² 2.5 cm ²	5 y	Similar results at 2 y Better clinical results and sports activity resumption in Hyalograft C group at 5 y
	Gobbi A Am J Sports Med 2009	Case series	34	4.4 cm ²	5 y	Significant improvement in all scores at 5 y Worsening respect to 2 y evaluation
	Nehrer S Am J Sport Med 2009	Case series	42 arthroscopy 11 arthroscopy	4.4 cm ²	2-7 y	Highly significant improvement for primary indications 9 of 11 failures for secondary indications
	Clar H The Knee 2010	Case report	1	14 cm ²	5.5 y	Continuous clinical improvement Bone and chondral regeneration at MRI
	Kon E Eur J Radiol 2010	Case series	50	2.5 cm ²	5 y	Significant improvement in all clinical scores Correlation with MRI analyses
	Della Villa S Am J Sports Med 2010	Comparative study	31 athletes 34 non athletes	2.2 cm ² 2.3 cm ²	57 m 52 m	Faster return to competition and better results over time with intense rehabilitation
	Kon E Am J Sports Med 2011	Comparative study	22 Hyalograft C 39 MACI	2.6 cm ² 3.1 cm ²	5.1 y 4.8 y	Significant improvement but 20% failure rate Faster recovery with arthroscopic implantation
	Bioseed C	Ossendorf C Arthritis Res Ther 2007	Case series	40	4.6 cm ²	2 y
Kreuz PC Arthritis Res Ther 2009		Case series	19	4 cm ²	4 y	Significant improvement and stable results at 4 y in degenerative defects Moderate to complete defect filling at MRI
Erggelet C Arch Orthop Trauma Surg 2010		Comparative study	42 ACI I gen 40 Bioseed C	2-17.5 cm ² 2-15 cm ²	2 y	Highly significant improvements in both groups at comparable level in chronic lesions
Zeifang F Am J Sport Med 2010		Randomized study	11 Bioseed C 10 ACI I gen	4.3 cm ² 4.1 cm ²	2 y	No difference for the primary outcome Lower MRI results at 6 m and clinical secondary outcome at 1 y and 2 y for Bioseed C

Product	Scientific Publication	Type of study	N° Patient	Lesion Size	Follow-up	Results
Bioseed C	Kreuz PC Am J Sports Med 2011	Case series	52	4.8 cm ²	4 y	Significant clinical improvement in all scores Persisting muscular strength deficit Moderate to complete defect filling in 43 of 44 MRI
CaRes	Welsch GH Am J Sports Med 2010	Comparative study	10 CaRes 10 Hyalograft C	4.6 cm ² 4.9 cm ²	2 y	Significant clinical improvement in both groups At MRI better cartilage repair tissue and surface for CaRes
Neocart	Crawford DC Am J Sports Med 2009	Case series	8	2.2 cm ²	2 y	Significant clinical improvement Improvement of knee function (not significant) At MRI good defect fill but maturation documented in 50%
Atelocollagen gel	Adachi N J Bone Joint Surg Am 2007	Case report	1	5+3 cm ²	2 y	Good clinical result after tissue-engineered cartilage and hydroxyapatite bone implant with MSC for osteonecrosis At MRI cartilage-like tissue and bone regeneration
	Tohyama H J Orthop Sci 2009	Case series	27	3.2 cm ²	2 y	Significant clinical improvement 92% normal or nearly normal arthroscopic appearance
Chondron	Kim MK Knee Surg Sports Traumatol Arthrosc 2010	Case series	30	5.8 cm ²	2 y	Significant clinical and functional improvement Significant MRI improvement Nearly normal arthroscopic appearance in 8/10 patients
	Choi NY BMC Musculo Skeletal Disorders 2010	Case series	40	5.2 cm ²	> 2 y	Significant clinical improvement Better results respect to a group with shorter follow-up
Cartipatch	Selmi TAS J Bone Joint Surg 2008	Case series	17	3 cm ²	2 y	Significant clinical improvement at 1 y maintained at 2 y Good MRI results with 81% defect filling Normal or nearly normal arthroscopic appearance in 11/13

Table 2.

PRODUCT	Scientific Publication	Type of study	N° Patient	Lesion Size	Follow-up	Results
TRUFIT	Carmont MR J Arthro Related Surg 2009	Case report	1	2.7 cm ²	2 y	Delayed incorporation at MRI and clinical improvement Good results at 2 y
Alginate Beads	Almqvist F Am J Sports Med 2009	Case series	21	2.6 cm ²	2 y	Significant clinical improvement No adverse events related to allogenic cartilage cells
MaioRegen	Kon E Am J Sports Med 2011	Case series	28	2.9 cm ²	2 y	Significant clinical improvement At MRI complete filling and integration in 70%
Chondrotissue	Patrascu JM J Bone Joint Surg 2010	Case report	1	6 cm ²	2 y	Full clinical recovery At MRI good integration, filling and covering of the defect
AMIC	Gille J Knee Surg Sports Traumatol Arthrosc 2010	Case series	27	4.2 cm ²	37 m	Significant improvement in all scores 87% highly satisfied patients At MRI 50% defect filling
	Pascarella A Knee Surg Sports Traumatol Arthrosc 2010	Case series	19	3.6 cm ²	2 y	Significant improvement in all scores Good MRI results
	Dhollander AAM Knee Surg Sports Traumatol Arthrosc 2011	Case series	5	2 cm ²	2 y	Clinical improvement in all patients at 2 y not confirmed by MRI findings

Scaffold-Based Repair For Cartilage Healing: A Systematic Review (cont.)

CaReS® (Ars Arthro®, Esslingen, Germany) is composed of autologous chondrocytes seeded on 3D type-I collagen gel. The cells are isolated, mixed with the collagen gel, and after complete gelling and two weeks of culturing, the chondrocyte-loaded gel is available for transplantation. Welsch et al. evaluated in a small group of patients two bioregenerative approaches: 10 patients underwent CaReS® implantation and were compared with 10 homogeneous patients treated with Hyalograft C®. Whereas the clinical outcome at 2 years was comparable, the MRI analysis showed better surface of the repair tissue in the CaReS® group.

Cartipatch® (TBF Banque de tissus, France) uses a vegetal origin hydrogel composed of agarose and alginate. This hydrogel is mixed with isolated autologous cell suspension and can be modulated at 37°C into complexly shaped implants that solidify at approximately 25°C. Alginate provides matrix elasticity, making it easy to handle. Selmi et al. investigated the clinical, radiological, arthroscopic and histological outcome at a minimum follow-up of 2 years for the treatment of chondral and osteochondral defects. Clinically, all 17 patients improved markedly, especially those with lesions larger than 3 cm², and good MRI findings, arthroscopic appearance, and predominantly hyaline cartilage in 62% of the biopsies were found.

Autologous chondrocytes cultured on atelocollagen gel have been used in Japan. Adachi et al. first reported a complex case where a corticosteroid-induced osteonecrosis at both knee condyles was treated with hydroxyapatite with interconnected pores (IP-CHA) and atelocollagen gel (3% type I collagen; Koken, Tokyo, Japan) was used as a scaffold for bone-marrow expanded cells and cultured chondrocytes, respectively, to regenerate both osseous and chondral tissues. A synovial flap was sutured to cover the lesion and secure the osteochondral implants. Despite the unremarkable arthroscopic findings at 1-year follow-up, MRI and clinical results showed a successful outcome at 2 years. Toyama et al. conducted a multicenter study on 27 patients to determine the usefulness of the atelocollagen-associated chondrocyte implantation for the repair of chondral knee defects. The first-generation ACL periosteal flap technique was used to host and protect the chondrocyte-atelocollagen gel. Both clinical and arthroscopic outcomes were positive, with a marked improvement and 92% of knees presenting normal or nearly normal arthroscopic appearance.

Another gel-type autologous chondrocyte (Chondron™, Sewon Cellontech Co. Ltd, Seoul, Korea) implantation has been used by Choi et al. This procedure involves the injection of cultured chondrocytes mixed with fibrin (1:1) into the defect area previously prepared with debridement and multiple holes to favor graft purchase, and without the need for periosteum or other membrane covers.

In a multicenter study they evaluated 40 patients with more than 2 years' follow-up, showing the safety and effectiveness of this method. Fibrin gel can provide a three-dimensional scaffold with the advantages of technical simplicity and minimal invasiveness and seems to provide satisfactory results, as also shown by Kim et al. In a study on 30 patients, they confirmed at 2 years' follow-up a significant clinical improvement, as well as good MRI findings and in the majority of the cases a nearly normal arthroscopic appearance.

One-Step Procedures

Different solutions for providing both scaffold and cells in one surgical stage have recently been proposed. Healthy cartilage tissue can be harvested from an unaffected area of the injured joint and mechanically fragmented, then embedded into a 3-D polymeric reabsorbable scaffold and implanted into the articular cartilage defect, or concentrated bone marrow can be used instead of chondrocytes, to provide mesenchymal stem cells to be added to the scaffold in a one-step procedure, but still no published clinical results for the treatment of knee chondral lesions are available in the literature.

Almqvist et al. proposed another one-step cell-based strategy, implanting mature human allogenic chondrocytes in a biodegradable alginate-based scaffold (Sigma, St Louis, Missouri) in 21 patients, and observed at 2 years no adverse reactions, a significant clinical improvement, but a hyaline-like tissue only in a small percentage of patients.

Nowadays, besides cartilage regeneration promoted by cells, chondrocytes (autologous or allogenic) or MSCs supported by 3D scaffolds, in research as well as in clinical practice, a new treatment approach is gaining interest, which involves the implant of various biomaterials for "in situ" cartilage repair exploiting bone marrow stem cell differentiation induced by the scaffold properties. In fact, an ideal graft would be an off-the-shelf product from both a surgical and commercial standpoint. The possibility to produce a cell-free implant that is "smart" enough to provide the joint with the appropriate stimuli to induce orderly and durable tissue regeneration is really attractive, and new biomaterials are recently proposed to induce "in situ" cartilage regeneration after direct transplantation onto the defect site.

One of these cell-free procedures is AMIC® (Autologous Matrix-Induced Chondrogenesis), a technique that combines microfracturing with the implant of a porcine collagen type-I/III bilayer matrix to stabilise the blood clot, which proved to be a reasonable 1-step treatment for cartilage defects. Gille et al. reported highly satisfactory results in 87% of the 27 patients evaluated at mean 37 months' follow-up, with MRI showing moderate-to-complete filling and a normal-to-hyperintense signal in most cases.

Patrascu et al. used an absorbable non-woven polyglycolic acid textile treated with hyaluronic acid (BioTissue AG, Zurich, Switzerland) as a sponge to hold the blood clot and progenitor cells, fixed to the lesion site with resorbable treads after standard microfracture procedure was performed, and reported a successful treatment of a 6 cm post-traumatic medial femoral condyle defect after 2 years. Two other alternative procedures have been described. Pasarella et al. combined a collagen patch (Chondro-Gide®; Geistlich) with hand-made 15-mm deep perforations with a 2-mm Kirschner wire, to exploit the advantages of the Pridie technique with a greater number of mesenchymal stem cells to enrich the membrane. They reported good results in 19 patients evaluated at a median of 2 years' follow-up. Dhollander et al. proposed an AMIC "plus" technique for the treatment of patellar lesions. In a pilot study on 5 patients, the classic AMIC® procedure was combined with the application of platelet-rich plasma gel, which aimed at further enhancing the healing response through the platelet-derived growth factors, but results, despite being good at 2 years, were not conclusive to the real usefulness of the combined approach.

For osteochondral articular defects different specific scaffolds have been developed. In fact, the treatment is biologically challenging since two different tissues are involved (bone and articular cartilage) with a distinctly different intrinsic healing capacity. Biphasic scaffolds aim at treating the entire osteochondral unit, by reproducing the different biological and functional requirements for guiding the growth of the two tissues.

Currently, only two scaffolds used for osteochondral regeneration are commercialized for clinical application. One is a bilayer porous PLGA-calcium-sulfate biopolymer (TruFit, Smith & Nephew, Andover, MA). Results after implantation of this osteochondral graft substitute are controversial with no available information on long-term durability, but Carmont et al. suggested that, although an intermediate postoperative interval can be associated with unfavourable MRI images, the plug appearance may significantly improve at further follow-up. Thus, they recommended perseverance, and reported a delayed incorporation and maturation of articular cartilage but good clinical results in an 18-year old footballer at 2 years.

The second osteochondral scaffold is a nanostructured biomimetic scaffold (Maioregen: Fin-Ceramica S.p.A., Faenza, Italy) with a porous 3-D tri-layer composite structure, mimicking the whole osteochondral anatomy: the cartilaginous Type I collagen layer has a smooth surface, the intermediate tide-mark-like layer consists of a combination of Type I collagen (60%) and HA (40%), whereas the lower layer consists of a mineralized blend of Type I collagen (30%) and HA (70%) reproducing the sub-chondral bone. This scaffold was introduced into clinical practice as a cell-free approach after animal studies showed good results in terms of both cartilage and bone tissue formation: it provided similar macroscopic, histological and radiographic results when implanting scaffold loaded with autologous chondrocytes or scaffold alone, probably inducing an in situ regeneration through stem cells coming from the surrounding bone marrow.

Promising preliminary results of a pilot study on 28 patients affected by chondral and osteochondral lesions have been recently reported. A slower recovery was observed in older, less active patients who experienced adverse events, or in patellar lesions. However, at 2 years of follow-up good results were reported in all patients with both clinical and MRI evaluations, showing the potential of this osteochondral one-step procedure also for the treatment of complex salvage lesions (table 2).

Discussion

Regeneration of the articular surface is a challenge faced by both surgeons in the operating room and basic scientists in the laboratory when aiming to restore a hyaline-like cartilage with normal tissue characteristics. In fact, the growing interest in cartilage regeneration can be seen at all levels by the increasing number of publications every year that focus on this topic from the in vitro tests, preclinical animal studies and clinical applications (figure 1).

Research in bioengineering has led to the development of new technologies and new surgical treatment options for cartilage lesions. The use of three-dimensional structures for cell growth has been shown to allow the maintenance of a chondrocyte differentiated phenotype, and the introduction into clinical practice of matrix-assisted ACI procedures, which offer a comparable clinical outcome but overcome most of the biological and surgical concerns raised by the first-generation methods. As reported in this systematic review, the clinical application of this tissue-engineered approach is described for different types of scaffold with an evaluation of the clinical outcome at short and medium-term follow-up and, due to the promising results obtained, the use of biomaterials for the treatment of articular cartilage lesions is strongly increasing. In fact, as polymers can be designed to have a wide range of properties and are easily modified depending on the biological/surgical strategy, many more are being developed. Several other natural and synthetic scaffolds for cartilage regeneration are under investigation and will be available in clinical practice. In particular, hydrogels have recently been developed as an attractive evolution of cartilage tissue engineering. Another important source of innovation comes from photopolymerization: liquid or gel scaffolds can be injected into the site of cartilage injury, thus requiring a less invasive procedure, and then polymerized by exposure to ultraviolet light. It is also possible to encapsulate cells within the gels, thus obtaining a scaffold with uniformly distributed cells and offering both surgical and biological potential advantages.

Scaffold-Based Repair For Cartilage Healing: A Systematic Review (cont.)

Autologous chondrocyte transplantation on a three-dimensional matrix was introduced into clinical practice in Europe between 1998-1999 and a considerable amount of clinical studies have been published. However, since introduction into clinical practice is recent, it is difficult to have a long-term follow-up. Moreover, most of the papers report case series; up to now only 7 non-randomized and 1 randomized controlled studies have been published, and the few available comparative studies are not conclusive. When trying to compare different studies, difficulties arise also because of the different study populations, follow-ups and evaluation systems used. Procedures may also differ for scaffold fixation methods and even surgical approach, mini-open or arthroscopic, as well as the post-operative rehabilitation phase. Differences among techniques have also been recently introduced by a new scaffold-based strategy for cartilage regeneration. MACT is a two-step approach that requires cell harvesting and manipulation. One-step cell-free approaches have been therefore developed to avoid the problems related to the ex vivo chondrocyte culture and expansion in a scaffold, besides reducing costs and surgical time. Finally, osteochondral scaffolds have been proposed to treat lesions where the subchondral layer is also involved in the pathologic process, and have shown promising preliminary results.

Regenerative techniques can offer the replacement of the articular cartilage with a hyaline-like tissue, and the use of scaffolds has simplified and further improved the potential of this treatment approach, but the properties of the healthy cartilage tissue are still unmatched by any available substitute. Moreover, despite the thousands of patients treated and the published studies that suggest good clinical results, for the time being there is no agreement about the effective superiority of the regenerative approach over the others, and both results and indications remain controversial. One explanation of the contradictory and not conclusive findings in the literature might be that regenerative procedures may lead to a hyaline-like tissue through a remodeling process, thus leading to superior clinical results detectable only after at least 2–3 years follow-up. Thus, medium-long-term comparative studies are mandatory to see the real potential of the bioengineered approach with respect to the more traditional and less ambitious procedures. Unfortunately, due to the recent development of these techniques, only a few studies report medium-term follow-up results, and up to now only a few comparative studies have been performed.

The regulation of tissue healing and regeneration is a complex process and further biological studies, as well as systematic long-term evaluation of the available treatment options, are necessary to clarify the role of many variables that could influence the results, such as cells, growth factors and different biomaterial properties, and to confirm the potential and promising preliminary findings of the scaffold-based strategy.

Conclusions

Regenerative scaffold-based procedures are emerging as a potential therapeutic option for the treatment of chondral and osteochondral lesions. In fact, this systematic review shows a growing interest at all levels, with an increasing number of publications focusing on this topic every year in in vitro studies, preclinical animal studies and clinical applications. One-step scaffold-based strategies have recently been developed to simplify the procedure, broaden the indications and further improve the results. Clinical application is reported for different types of scaffold at short and medium-term follow-up with promising results, but well-designed studies are lacking. Systematic long-term evaluation of these techniques and randomized controlled studies are necessary to confirm the potential of this tissue-engineered approach, especially compared to the available traditional treatments.

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A Short Insight into the Management of the Extreme Sports Athlete

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Worldwide adventure tourism and sports have developed remarkably and gained enormous popularity in the past two decades. These extreme sports activities are popular not only with adventurous elite athletes, but more and more people participating in adventure sports on a recreational basis. A recent report estimated that the number of extreme sport participants in the United States alone to be around 275 million person-events per annum. Altogether participation in fourteen different extreme sports activities occurred. Mass media interest, lifestyle factors and a youth culture lead to an increased extreme sport's audience appeal. The impressive film footage of these sports, including breath taking stunts and rare portrayal of injury and fatality, has attracted not only sports fans but also major television networks, their audiences and advertising, with associated financial investment.

Those adventure sports perceived to be more sensational and dangerous are termed extreme sports and include, amongst other, versions of mountain climbing, snowboarding and skiing, big wave surfing, free diving, white water kayaking, mountain biking, sky diving and BASE jumping.

Injuries:

The injury epidemiology of traditional sports is being increasingly understood with national surveillance and injury reporting programs. The mechanism of most of these injuries has been established, and when sustained, athletes tend to follow a management algorithm, featuring non-operative care, surgical requirement and rehabilitation, before return to play. By comparison the injury mechanisms of extreme sports are less understood, particularly the pattern of injury in many sports. In addition, the athletes themselves, by their very nature, are keen to participate in new treatments or progress straight to the surgical option, even in the absence of established outcome studies.

Physicians must appreciate that extreme sports participants are likely to return to their sport irrespective of their functional outcome. In this respect, a poor outcome from non-operative management is likely to increase the chances of re-injury or worse. It is understandable that some physicians may consider an adequate outcome as being acceptable and possibly act as a deterrent from future participation. They could be considered to be providing a good treatment option and from their point of view are looking after their patient's best overall interests.



A BASE jumper leaps off Marina Bay Sands Skypark, 200 meters over Singapore downtown. Picture courtesy of Dr. Omer Mei-Dan.

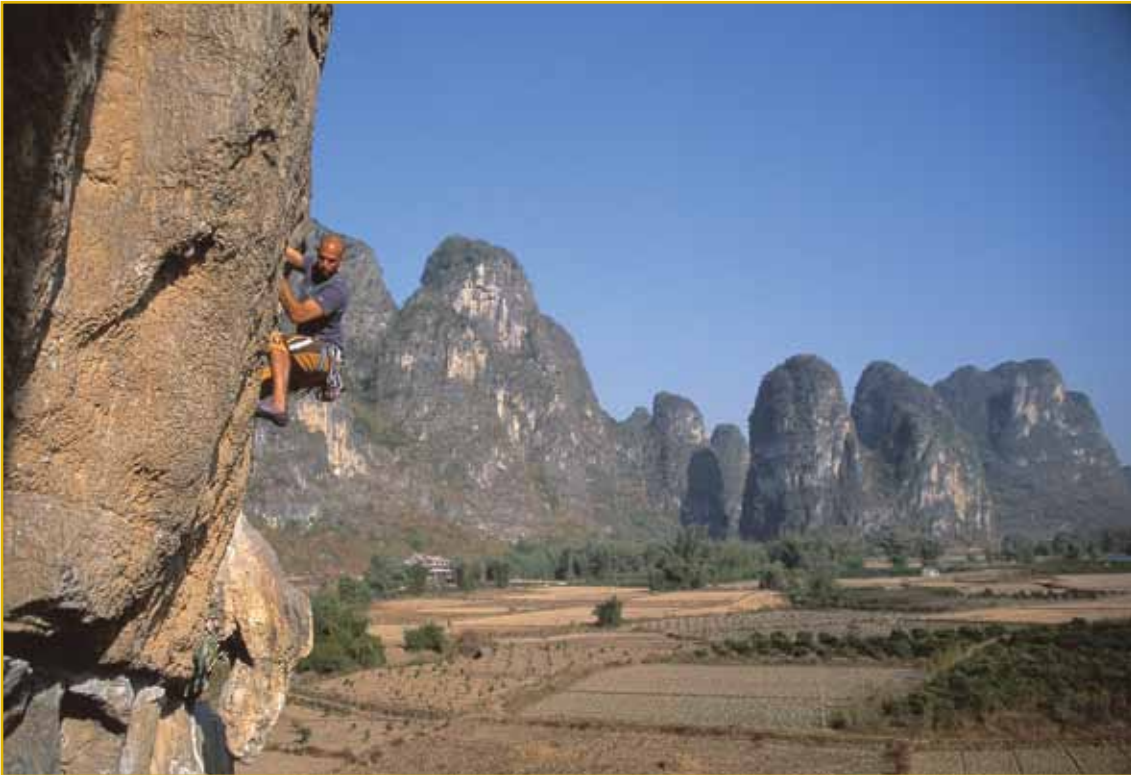
This however is simply not the case. Telling a climber that reports on fingers pain only while climbing, "so stick to other sports", would just leave them upset and to seek other medical advice. This may be similar to surgeons treating obese patients with knee pain attributing all their problems to their obesity. If weight loss is mentioned early in the consultation the rapport is frequently lost and the consultation breaks down. In our experience extreme sports athlete tend not to modify their life patterns and sports participation as other athletes may do.

It is also unfortunate but understandable that some surgeons may also have the attitude of why should we go to all that trouble when these athletes are more likely to return to their sport with its possible consequences. It must be remembered that these patients undertake these sports as it is their passion, rather than merely a whim. By comparison it can be argued that drink driving leads to far more injuries and self inflicted deaths than occurs during extreme sports participation.

Environment:

By their very nature adventure sports involve high mountains, savage seas, tumbling rivers and baking deserts. These are found in remote locations far away from habitation and settlements. The extraction of an injured recreational athlete relying on local and government assistance may take a considerable period of time and an element of recovery may be required before surgical fixation can be achieved. Professional extreme sports athletes by comparison tend to have invested a considerable period of finance and planning for their sports and stunts. They usually have made arrangements for private extraction and transfer to private medical facilities so that their acts are not a burden on these frequently poorly supported local health care resources.

A Short Insight into the Management of the Extreme Sports Athlete (cont.)



Rock climbing in China's Yangshuo region. Picture courtesy of Dr. Omer Mei-Dan.

In addition when injury occurs this typically results in multiple injuries with high Injury Severity Scores and urgent rescue and transfer to high level trauma center is required. Some geographical locations where extreme sports have evolved have become very popular and local services have developed into designated rescue team, usually air ones, to answer this needs. Examples for this are the Norwegian fjords and Swiss cliffs which attracts many BASE jumpers year round, the Verdon or Chamonix rock faces considered as climbers Mecca's or the establishment of many hyperbaric chambers in popular diving sites.

Competition:

Reported injury rates in extreme sports may be expected to increase during competition rather than training. This behavior is well known for common team sports. Similar observations are noted in head to head or judged competitions and are expected in extreme sports when athletes are trying to push their limits even further for prizes, audience or fame.

The published injury rate for various extreme sports series has been determined however in some disciplines the fatality rate is hard to establish due to the lack of formalized events. In many situations the competition is against oneself or the forces of nature and the sport is practiced in relative isolation. Accordingly, some extreme sports fields, like BASE jumping, tend to eliminate official events where more fatalities could be expected.

Return to play:

Published reports on extreme sports athletes suggest they return to active participation once rehabilitation is

completed, even after life threatening and disabling injuries. Although half of injured white water kayakers sought medical care for their injury, and almost one third missed more than one month of kayaking because of their injury, almost all (96%) reported a complete or good recovery with the best outcomes associated with impact injuries and the worst with overuse ones. A recent report has shown that of 68 studied BASE jumpers, 43% have sustained at least one severe injury during their time in the sport, of which 52% required acute surgical intervention. Also, 72% of the jumpers had witnessed the death or serious injury of other participants in the sport while 76% had at least one "near miss" incident. Nevertheless, all of these jumpers maintained active participation in the sport. These reports, and others, implies that adventure sports athletes see injuries as integral part of the sport and are typically motivated to return to their sport. Specialised rehabilitation is frequently required as sports tend to feature one predominant key manoeuvre or action. A graduated return to extreme sports activity cannot technically occur as most require full commitment and an 'all or nothing' level of performance is needed.

Simulation exercises can be performed in a reduced risk environment prior to full return as clearing an extreme sports athlete to sports resumption before body and mind are fully ready may result in life threatening injuries rather than 'just' a re-injury in common sports. A dislocation prone shoulder in the skydiver or base jumper can result in inability to deploy the parachute on time or at all. Following a shoulder stabilization surgery, and rehabilitation program, the athlete would be better off testing his shoulder stability and function primarily in a wind tunnel environment rather than off the nearest 200 meter cliff.

Similar to other sports participants, we recommend internal fixation should be removed following bone union due to the relatively high risk of traumatic re-injury. A peri-prosthetic fracture is complicated to manage in both young and old alike.

Age:

Professional or high level competition in traditional sports tends to reduce in most high profile sports with aging. Most top level participants tend to retire in their 30's to 40's. The recreational aspect of many adventure sports encourages athletes to participate within the level of their physical ability for much longer and still with an element of competition, and possible danger. In some cases the added experience and maturity (or courage) of the participant allows them to remain at the top level depending upon the sport, and compensate for some age related decline in physical performance e.g. yacht racing or big wave surfing. These sports tend to feature a considerable aspect of endurance rather than focused strength or agility.

For many extreme sports a considerable level of experience is required to make the sport safer or even being able to engage with it in the first place. BASE jumping may seem like a more exciting version of skydiving but proficiency in the cores skills of position control whilst falling through the air next to a cliff, canopy opening and steering are vital to reduce the risk of ground or cliff strike. Most BASE jumpers would be expected to have completed several hundred sky dives before undertaking their first BASE jump.

Psychological:

Studies of risk-taking sports people, such as mountaineers and BASE jumpers, indicated that their temperament traits scores differ significantly when compared to normative population 9. When BASE jumpers were assessed based on a temperament score of harm avoidance they actually found to have much lower scores than a non jumping population. A subject which has scored low in this temperament trait would be defined as carefree, relaxed, daring, courageous, outgoing, bold, optimistic even in situations which worry most people and confident in the face of danger and uncertainty. As temperament traits are thought to be neurochemically regulated and moderately heritable, it is likely that to some extent engagement in these sports is genetically determined and 'hard-wired'. However, no tightly defined personality profile amongst mountaineers and BASE jumpers was found .

Extreme sports athletes may self select for their sport, in that they are more capable of responding appropriately in an adverse situation and thus do not perceive the situation as dangerous compared to the perception of the non participating population. Most certainly participants are aware of the risks and consequences of their actions including death or disablement.

The ability to be able to respond immediately to an equipment malfunction or a "miss-hap", stand as a basic prerequisite for survival in the extreme sports world.

In summary, the management of the injured extreme sports athlete is a challenge to surgeons and sports physicians. The margins for error in these sports are small and athletes as patients are more likely to return to their activities than the general sporting population following injury. Surgeons should plan their management with great care and attention to detail.

These sports activities may be considered to be fool hardy by many. The majority of athletes performing these sports and challenges will have spent a great deal of time in preparation to minimize the risks involved. The risks of inexperienced mountaineers paying for supported trips up Everest or participating in charity sky diving events are far higher and yet these are frequently seen as laudable activities.

Full article and references also available online at www.isakos.com.

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Pearls for Rotator Cuff Repair

Dan Guttman, MD

Director of Shoulder and Elbow Surgery

Taos Orthopaedic Institute

Co-Director

Taos Orthopaedic Institute Sports Medicine Fellowship

Clinical Assistant Professor

University of New Mexico School of Medicine Department of Orthopaedic Surgery

Upper Extremity Committee ISAKOS

The following are some pearls I have learned over the last 12 years for Arthroscopic Rotator Cuff Repair.

1. Do not repair any tissue under tension. It is critical to recognize the patterns of tears that occur in the Rotator cuff. Generally there are crescent type tears, L-shaped and reverse L-shaped tears, and U-shaped tears. These tear patterns may be relatively small, medium, large or massive. In addition, these tears, especially when they are chronic, can also include delamination, atrophied and /or fatty infiltrated changes in the tissue.

The importance of recognizing the tear pattern, allows the surgeon to strategize how the repair will be performed. Distinguishing these tear patterns can be done pre-operatively by review of the MRI. The goal is to bring the torn tissue as close as possible back to the original insertion. To reestablish the anatomic footprint is not always possible without causing undue tension on the tissue. In many cases, releases of scarring, mobilization of retracted tissue, interval slides, and inclusion of delaminated layers are critical to repair while minimizing tension.

2. The decision to perform single row versus double row is still being hotly debated.

There are many factors that can influence this decision. My strategy is to let the tissue condition and tear pattern help dictate the repair construct.

If the tear pattern is a crescent and or L-shaped tear, and the tissue is good quality, the tear is medium to large without significant retraction or delamination, a double-row trans-osseous equivalent repair is my treatment of choice. If the tear is a large to massive U-shaped tear, then a marginal convergence repair is done and usually combined with a single row repair or modified double row.

3. It is critical to assess the long head of the biceps tendon (LHBT). Frequently, the LHBT is inflamed, flattened, subluxed and or unstable (if associated with a SLAP lesion). In these cases, either a biceps tenotomy or tenodesis is performed to prevent issues post-operatively with biceps pain or dysfunction, that might require a second procedure.

Also frequently associated with LHB disease is Subscapularis tears, often partial upper border tears. This can often be missed, unless it specifically looked for. In these cases, sometimes a coracoidplasty may also be indicated.

4. A conservative rehabilitation program is important in order to allow the repair of the rotator cuff to heal properly. Be prepared to modify your rehabilitation protocol for small tears versus large to massive tears. Supervised physical therapy may be better than a home based program focusing on mobility for improving shoulder function. Work closely with the physical therapists to keep track of your patients and to modify the protocol when indicated. Avoid the use of pulleys and pendulum exercises early on. Focus on scapular stability and core strengthening as part of the rehab process.

A sling with an abduction pillow can facilitate minimizing the stress on the repair.

5. Spending time to adequately visualize the subacromial space is critical to complete an adequate and definitive Rotator Cuff reconstruction. Especially cleaning up the lateral aspect of the subacromial space (the gutter adjacent to the greater tuberosity) in cases where a double row repair is performed.

6. Avoid surgery on the patient with severe adhesive capsulitis. Try and maximize the ROM of the shoulder prior to surgery.

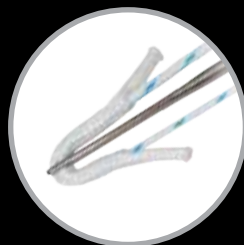
7. Avoid patients who smoke.

Full article and references also available online at www.isakos.com.

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1.) Data on file at Biomet Sports Medicine. Testing was performed in bone block. Bench test results not indicative of clinical performance.

2.) Barber FA, Herbert Ma, Hapa O, Rapley JH, Barber CA, Bynum JA, Hrnack SA. "Biomechanical Analysis of Pullout Strength of Rotator Cuff and Glenoid Anchors. 2011 Update." *Arthroscopy* 2011.

*Testing was performed in bone block. **Testing was performed in porcine bone.

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ACL injuries in Sumo Wrestlers



Masamitsu Tsuchiya, MD
 Chief of Orthopaedic Surgery and Vice President
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Sumo wrestling is national sports of Japan with a 2000-year of history, associated with Shinto rituals. Our hospital is located right next to the sumo stadium, Kokugikan in downtown Tokyo. Easy access to our

hospital resulted in numerous sumo wrestler patients.

We have treated 5094 injuries in 1425 sumo wrestlers for 27 years. Locations of sumo injuries consisted of trunk (26.3%), upper extremities (21.3%) and lower extremities (51.2%), of which the knee injuries consist up to 26.5% (Fig. 1, 2). The data indicate that sumo wrestlers were susceptible to lower extremity injuries.

ACL (Anterior Cruciate Ligament) lesion is important for sumo wrestlers. Forced knee valgus and external rotation stress of the lower leg by the opponent's pushing out was the main cause of ACL injury (Fig. 3). Eighty one ACL reconstructions in 76 sumo wrestlers were performed arthroscopically in our Orthopaedic department with age averaged 20 years, height 180 cm, body weight 126kg and operation time for 3 hours 46 min. Reconstruction methods included 38 cases of BTB (Bone, patellar-Tendon, Bone) tendon and 39 cases of STG (Semi-Tendinosus, Gracilis) method. Ruptured ACL (Fig. 4) and reconstructed ACL by BTB method are shown (Fig 5).

Anterior instability was improved successfully in both methods (Fig. 6). However, quadriceps muscle power, indicated by WBI(Weight Bearing Index), recovered well in STG methods (Fig. 7). WBI means the value calculated by the peak torque of isometric quadriceps divided by body weight. One WBI indicates how much their own body can lift up with one leg. Transition of sumo ranking after operations was almost equal in both methods.

Concerning complications, infection by staphylococcus epidermidis was observed in 2 cases. One case was compound knee ligament injuries with open fracture and dislocation in the ankle. After ACL reconstruction, the artificial ligament used for MCL (Medial Collateral Ligament) reconstruction was infected. Infection was improved after removal of the artificial ligament and suction-irrigation therapy. Another case was improved using venous antibiotics injection for 10 days. We experienced no deep vein thrombosis.

The wrestlers return to the ring averaged 7.4 months after ACL reconstruction operations. Six cases retired completely.

Thirty- three cases retired from the ring averaged 4.2 years after operations, About half of the ACL reconstructed wrestlers are active. The longest sumo wrestler after ACL reconstruction played for 12 years after operation, and he kept high Sekitori rank more than one third of his carrier

Six cases were poor results consisting of ACL rerupture and instability beyond 4 mm in KT-1000. Two cases were BTB methods and 4 cases STG.

Today, we reconstructed the wrestler's ACL ruptures mainly using BTB tendon, because of the superiority of bony union comparing the STG tendon.

Because the wrestlers' knee is huge and heavy (Fig. 8), man power and long operation time are necessary.

We checked operation time in arthroscopic ACL reconstructions. Reconstruction method was all STG, and all operators were performed by knee specialists. Correlations of operation time and BMI (body mass index) were statistically significant (Fig. 9). The result revealed that arthroscopic ACL reconstructions in big and heavy sumo wrestlers were tough and time consuming operation. However, sumo wrestlers suffering from ACL decreased their performance significantly. Therefore, we will continue these challenging treatments for sumo wrestlers and help them return to the ring as soon as possible.

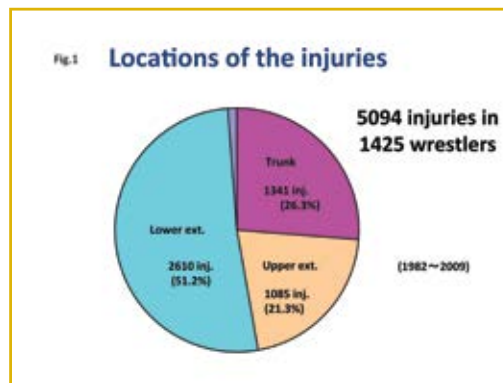


Fig.1 Locations of the injuries

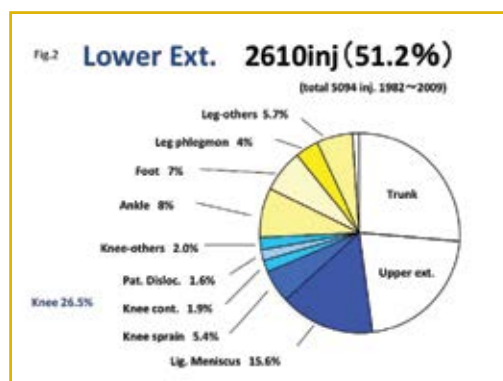


Fig.2 Details of the injuries in lower extremities



Fig.3
The scene of ACL injury. Left sumo wrestler injured his right knee forced knee valgus and external rotation in the lower leg.



Fig.4
Injured ACL ligament

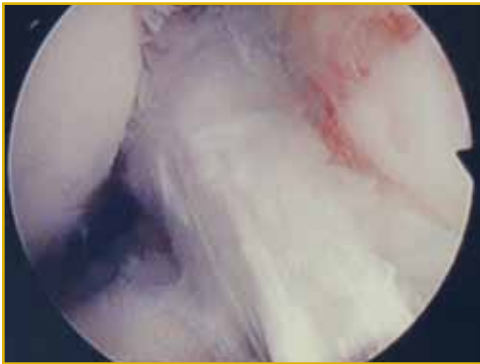


Fig.5
Reconstructed ACL ligament by BTB method

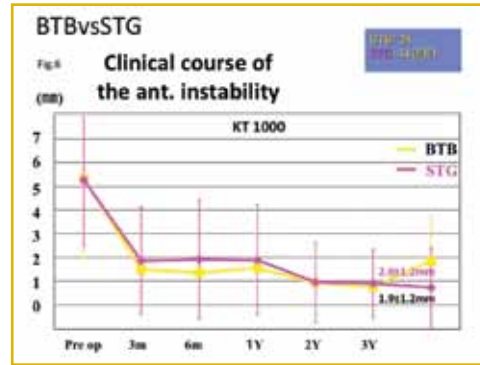


Fig.6
Clinical course of the anterior instability using KT-1000

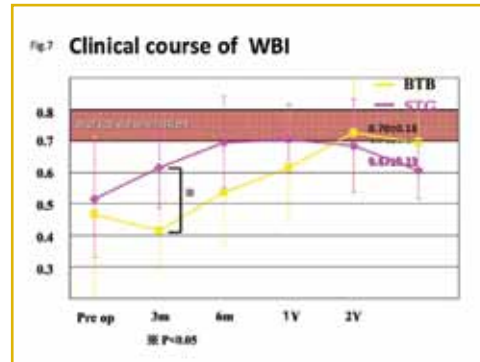


Fig.7
Clinical course of WBI



Fig.8
A photo during operation, showing big and heavy Sumo wrestler's knee

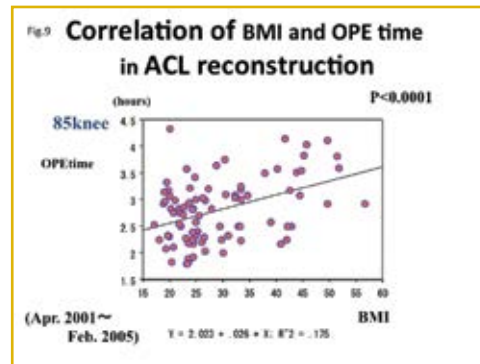


Fig.9
Correlation of BMI and operation time in ACL reconstructions.



ISAKOS Specialty Day at The 6th International Congress of Chinese Orthopaedic Association



COA 2011
Chinese Orthopaedic Association

Jon K. Sekiya, MD

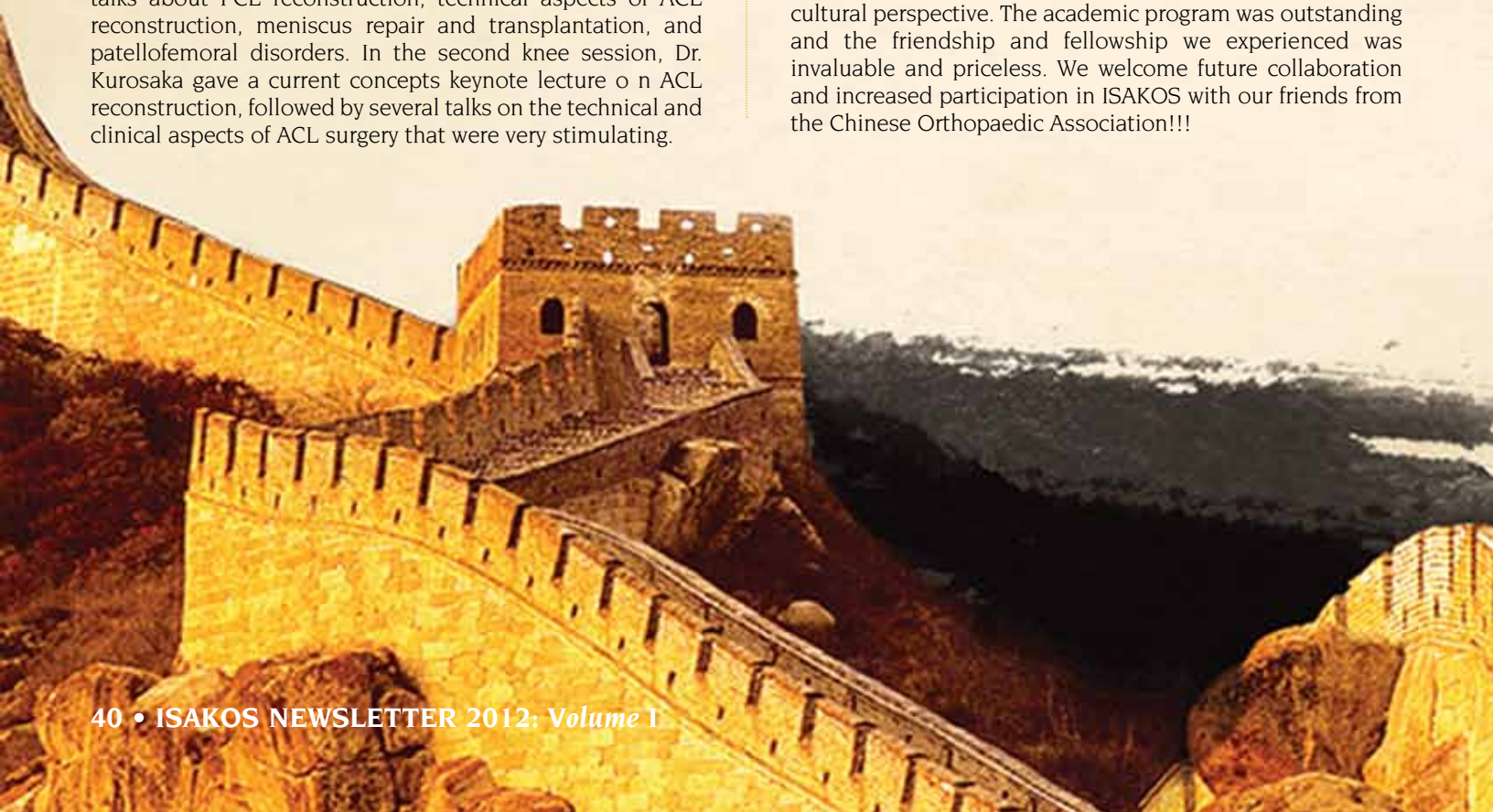
On the request of Prof Yan Wang, President of the Chinese Orthopaedic Association (COA), Dr. Freddie Fu (Past President of ISAKOS and American Orthopaedic Society for Sports Medicine) organized a combined ISAKOS/COA Specialty Day that was held in Beijing, China on December 3, 2011. Invited speakers from ISAKOS included Drs. Moises Cohen (President), Joao Espregueira-Mendes (President Elect, European Society of Sports Traumatology, Knee Surgery and Arthroscopy), Philippe Neyret (Second Vice President), Masahiro Kurosaka (President Elect), Norimasa Nakamura, and Jon Sekiya. Dr. James Chow, past president of the Arthroscopy Association of North America, was also invited to participate.

The specialty day got off to a great start with welcome addresses from Drs. Fu, Wang, and Cohen. The academic session began with Dr. Guo-Ping Li (Vice President, International Federation of Sports Medicine) talking about the logistics and infrastructure of the medical care given during the 2008 Beijing Olympics. In the first knee session, Dr. Neyret gave the keynote lecture on the current state of osteotomies about the knee, and several speakers gave talks about PCL reconstruction, technical aspects of ACL reconstruction, meniscus repair and transplantation, and patellofemoral disorders. In the second knee session, Dr. Kurosaka gave a current concepts keynote lecture on ACL reconstruction, followed by several talks on the technical and clinical aspects of ACL surgery that were very stimulating.

This included a talk by Dr. Shiyi Chen (Co-chair of the Specialty Day) on the future of artificial ACL reconstruction. I gave the keynote lecture on hip arthroscopy, and Dr. Chow delivered the keynote lecture for the shoulder session on current concepts in shoulder arthroscopy. The basic science session was led by Dr. Nakamura who gave the keynote lecture on the basic science and clinical applications in the management of cartilage defects. This was followed by several talks on the diagnosis and management of articular cartilage lesions including a talk by Dr. Espregueira-Mendes on mosaicplasty. Much was learned during this day of wonderful presentations and lively discussions. I know I gained a wealth of knowledge listening to these talks and seeing these outstanding presentations!!!

Following the Specialty day, Dr. Yingfang Ao, President of the Chinese Arthroscopy Society, hosted several of the ISAKOS members (photo courtesy of Dr. Nakashima) along with the board members of his society at the delightful Wu Ming Ju Restaurant, which served a host of delicious Chinese cuisine. It was an evening to remember with satisfied appetites and many toasts to celebrate the successful day!

In summary, this was an incredible learning experience with a wonderful exchange of ideas and practices from a multi-cultural perspective. The academic program was outstanding and the friendship and fellowship we experienced was invaluable and priceless. We welcome future collaboration and increased participation in ISAKOS with our friends from the Chinese Orthopaedic Association!!!



ISAKOS APPROVED COURSES IN REVIEW





ISAKOS Approved, and in association with
Indian Arthroscopy Society & Delhi Orthopaedic Association

1st Congress of Indian Cartilage Society

1st Congress of Indian Cartilage Society was held in New Delhi on 12–13th November. Deepak Goyal, who is also Chair of Subcommittee for Developing Regions, ICRS; chaired the Congress. The Congress was perceived very well by the faculties, delegates and Industry. This course was one of the first full fledged congress held independently by a National Cartilage Society. Usually such meetings are held on the sidelines of major congresses hosted by a prominent society. The congress was also an ISAKOS Approved Course.

Following is the brief description off various events.

1st Congress of Indian Cartilage Society was highlighted by top International Faculty on Cartilage Science coming from various corners of the world. Prof Mats Brittberg, Nakamura Norimasa, Asode A Shetty, Prof B H Min, James Hui Hoi Po, Nobuo Adachi, Alberto Restrepo and Deepak Goyal were few of the prominent International faculties present. There were also National Faculties present during the Congress.



Faculty Tour of New Delhi Tour, in front of magnificent Red Fort

The final count of registration was 120. There were few 'no shows' because of simultaneous Arthroscopic Cadaver Course going on in the city on the same dates. In spite of best effort to cross check any cross dates between two similar meetings; this Cadaver Course meeting could not be foreseen.

Delegates came not only from various states off India, but were also from Iraq, Oman and Nepal. Members of Indian Arthroscopy Society and Delhi Orthopaedic Association were also present during the congress. Congress also saw 32 new members joining the society. All these new members joined as Life Members.



Faculty in front of Original Congress Emblem

The congress was preceded by Social Programs like New Delhi City Tour and Faculty Dinner on 11th November 2011. Faculty visited 360 years old magnificent Red Fort of the capital city where they were informed about Moghul History of India in detail. Faculty paid their homage at Mahatama Gandhi Memorial, before proceeding for the lunch. Spicy and hot, various varieties of chicken were served at Restaurant Chicken Inn. This delicious experience was first time experience for many of thee International Faculties. After lunch, they visited 800 years old Kutub Minar and were awed by its beauty and brave history. Emblem of 1st ICS congress also come from here and hence all were very happy too take their photographs in front of original Emblem of the Congress. After relaxing at hotel, Faculty was taken to a Five Star Hotel for Faculty Dinner. Here they were greeted by Traditional Indian Headgears and they enjoyed their new attire throughout Dinner. Dr. Brittberg was overwhelmed to see a surprise cake on his Birthday.



Faculties were honoured with Marble Vas studded with Indian Paintings in Gold, during Faculty Dinner.

The Scientific program on the 1st day of the Congress consisted of Key Note Lectures, Didactic Lectures, Case presentations, Interactive Discussions etc. Pre Lunch sessions included 'Basic Cartilage Science Session'; 'Cartilage Imaging Session'; 'Session on Introduction of Microfracture, OATS and ACI Techniques'; and 'Chondral lesions in General Orthopaedic Practice'. Most of the sessions were planned in such a way that International faculties share their experience and research with the delegates, and in the same session national faculty presents their work done with limited opportunities and facilities.

ISAKOS APPROVED COURSES IN REVIEW

Such faculty combination provided an excellent platform for discussion between International and National faculties. There were also intense discussions on cases presented during the meeting. It gave opportunity to delegates to discuss various constraints they face and ways to overcome that with International Faculty.



Common platform for International and National Faculty

Before Tea break, there was a small inauguration ceremony. Raju Vaishya, Organizing Secretary of the Congress welcomed delegates to New Delhi. Nishith Shah, President of Society thanked international faculties for their time and contribution to *Indian Cartilage Society*. Deepak Goyal elaborated the need of Cartilage Repair Techniques in Indian Subcontinent. Society announced that it is society's honour to offer Patron Membership to Mats Brittberg. A Golden Plaque citing his Patron Membership was presented to him during the inauguration.

Post lunch sessions included; 'Present results of various Cartilage repair techniques', 'Decision Making in Cartilage Lesions of various sizes in different age groups' & 'Role of Biomechanics in Cartilage lesions'. Dr. Nakamura's lecture on 'Results of ACI vs MTX' generated a lively discussion. Delegates were happy to learn various techniques shown by faculty during Decision Making session.



Nakamura Norimasa dancing to Bollywood tunes.

There was another social program along with Conference Dinner on 12th evening. Delegates were thrilled to hear James Hui Hoi Po and Norimasa Nakamura; singing Hindi Melody songs from old Bollywood films. It was fun to watch Persian Belly Dancer, while trying various Indian delicacies during the evening. Soon, Delegates and Faculties; both hit the floor and danced to various Bollywood tunes.



Enjoying a lighter moment in the Exhibit Hall

Second day started with few case reports followed by a live surgery for 'Assessment of Cartilage Lesion and Cartilage Biopsy'. After that; Deepak Goyal operated a case of early Medial Compartment OA with cartilage lesion. He did 'Microfracture of the lesion followed by Proximal open wedge HTO'. Intense discussion was generated by James Hui Hoi Po during this surgery, who was chairing this session. Last surgery of the day was 'ACI Implantation case'. Biopsy of this case was done six weeks before and cells were ready for implantation on the day. Delegates coming from various corners of the country were enthusiast to learn all these new surgeries.

It was decided by General Body that next congress of the Society shall be held in Chennai in November 2013. P Rajasekar volunteered to be the next host. Industry was very thankful to the organizing committee for giving them this wonderful opportunity to showcase their products. Three companies immediately confirmed their Platinum/ Gold Sponsorship for the next congress.

Delegates, industry and faculty were given ample opportunity to have one to one discussion during various social programs and during Dinner. Various Indian companies interacted with faculties for suggestions to improve their designs.

Meeting concluded with a thanks note from the Chair, Deepak Goyal.

Two-thousand Orthopaedic Surgeons Succeeded with Fruitful Discussions in Sapporo

A Report on the 3rd Annual Congress of the JOSKAS



Kazunori Yasuda, MD, PhD

President, the 3rd Congress of the JOSKAS

Professor and Chairman, Hokkaido University Graduate School of Medicine

On behalf of the JOSKAS (Japanese Orthopaedic Society of Knee, Arthroscopy and Sports Medicine), I, as the Past President, would like to report on the 3rd Annual Congress of the JOSKAS held in

Sapporo Convention Center, Sapporo Japan, on June 16-18, 2011. The JOSKAS was established 3 years ago with the integration of the Japanese Arthroscopy Association (JAA) and the Japanese Knee Society (JKS), which had their own respective histories for 30 years. For example, the JAA was established in 1975, and Masaki Watanabe, MD, "Father of Arthroscopy", became the first President of the JAA. Currently, the JOSKAS is growing into a large society having an active membership of over 2500 orthopaedic surgeons.

On March 11, 2011, we had an unprecedented disaster here in Japan. The Tohoku Area suffered a great deal of damage from both the earthquake and tsunami. Thereafter, many scientific meetings and congresses were cancelled in Japan. We also carefully considered for 3 months about the validity of opening this JOSKAS Congress, consulting with Professor Mitsuo Ochi, Director of the JOSKAS, and the JOSKAS Executive Committee. Subsequently, we decided to open the 3rd JOSKAS Congress in Sapporo according to the planned scientific schedule, because we had fortunately had no damage here in Sapporo and we believed that the possible success of this Congress would contribute to the revival of Tohoku and Japan in general. All Japanese had sworn to overcome this unprecedented disaster, and make efforts to try and revive the Tohoku Area in various aspects as soon as possible. Therefore, we also decided to cancel some extravagant social events in this Congress, and the cost for the cancelled events would be given to the relief fund for the victims of the earthquake and tsunami.

Thus, the Congress was successfully held for the three days. The main themes of this congress were to make cutting-edge discussions in each field, viewing the future in their perspective, and to educate young doctors whom these scientific fields in the next generation rested upon. The Congress Program included 12 Special Lectures, 12 Educational Lectures, 13 Symposia, 344 Podium Presentations, and 451 Poster Presentations.



3rd JOSKAS in Sapporo JAPAN

One-day Educational Hands-on Seminar on Arthroscopy was also held for young doctors. International lectures and presentations were given by our outstanding guests: B. Reider, MD; G. Poehling, MD; F. Fu, MD; D. Dalury, MD; B. Min, MD; J. Hui, MD; C. Chen, MD; D. Goyal, MD; S. Chen, MD; B. Fleming, PhD; and M. Murray, MD. I would like to thank them very much for their great contributions to the Congress. Subsequently, approximately 2000 orthopaedic surgeons and sports medicine professionals attended the 3rd JOSKAS Congress. They enjoyed participating in fruitful discussions or receiving practical educations. The 3rd JOSKAS Congress was tremendously successful. Finally, in accordance with the general will of the JOSKAS members, as described above, we officially made a donation of 15,000,000 Yen from the 3rd JOSKAS Congress to the Relief Fund for the Victims of the Earthquake and Tsunami. In addition, some of our international guests personally and very kindly donated to the Relief Fund during their stay in Sapporo. I cordially appreciate all the JOSKAS members and the international guests.

At the end of this report, I would like to state that JOSKAS strongly hopes to contribute not only to the progression of the field of Knee Surgery, Arthroscopy, and Sports Medicine but also to the development of ISAKOS. We will continue to make efforts to do so. The 4th JOSKAS Congress will be conducted by President Hiroshi Mizuta, Professor of Kumamoto University, in Okinawa on July 19-21, 2012.



International guests

ISAKOS APPROVED COURSES IN REVIEW



Symposium and Attendee



President Yasuda and his colleagues

2nd Annual Scientific Meeting of Indonesian Hip and Knee Society (IHKS)

ISAKOS was well represented at the 2nd Annual Scientific Meeting of Indonesian Hip and Knee Society (IHKS) in Jakarta on Jan 13–15, 2012. ISAKOS committee members Dr. Nicolaas C. Budhiparama and Dr. Andre Pontoh, President of IHKS and Chairman of Organizing IHKS Committee respectively, welcomed more than 600 participants for the meeting. ISAKOS past president, Dr. Freddie Fu, USA, was honored with 2 plenary lectures and Dr. John Bartlett, Australia, with another one.



THURSDAY, 12 JANUARY 2012	
08:00 - 08:30	IHKS ORGANIZATION MEETING
FRIDAY, 13 JANUARY 2012	
08:00 - 08:30	RE-REGISTRATION Lobby (Indonesian)
08:30 - 09:00	OPENING CEREMONY (Auditorium)
09:00 - 10:30	PLENARY LECTURE 1 (Auditorium) Moderator: Mohammad Hidayat (Indonesia)
09:30	Anatomical ACL Reconstruction – A Changing Paradigm – Freddie Fu USA
10:00	Robotic Guidance in Total Hip Arthroplasty – Richard James USA



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A Discussion on Shoulder Arthroscopy

CASE DISCUSSION

- Daniel Slullitel, MD, Prof.
ARGENTINA

The Case. The patient is a 21 year old, 1.97 meters tall, and 105 kilos in weight (5ft, 11 inches tall, 231 pounds). He is a Second Row Rugby player, still amateur. At age 18 he was just starting in state teams when he dislocated his right shoulder and started subluxation on his left one.

At clinical examination the patient had more than 80 degrees of external rotation at the side, plus Hyperextension off elbow and First metacarpal joint plus and a Sulcus sign. He had surgery on his right shoulder with three anchors in May 2009. In November 2009, he redislocated upon his return to sport. In January 2010, the patient had another arthroscopic procedure in his right shoulder including 5 anchors (3 anterior, 2 postero-inferior) after findings of a huge capsular pouch and a small labrum with an inferior detachment. The patient also had a small Hill Sach lesion, with no bony Bankart.

In March 2010, the patient had arthroscopic surgery in his left shoulder. At that time his left shoulder had no bone loss but a big capsular Anteroinferior pouch with a small labrum, no Bankart lesion and Small Hill Sach. Three Anterior anchors 2 posteroinferior ones and an interval closure was made.

In November 2010, he started playing and sustained on February 2011 a direct hit in the anterior part of his shoulder and a sense of subluxation. An early MRI was taken to profit of a probable hemiarthrosis and a Posterior Bankart lesion was confirmed. After careful rehabilitation no cuff deficit was present, and no O'Brien signs or sulcus sign, no apprehension signs so he returned to play. On September 2011 he sustained an ACL lesion which is in process of rehabilitation. He has felt once more a sense of subluxation once with no trauma..

It is known, and published, that some centers perform arthroscopic FAI procedures at early stages of the degenerative disease, on a regular basis, while for some that would be a clear contra indication.

Questions

- Do you consider this a traumatic dislocator or an Atraumatic one?
- Which surgery would you suggest at the first injury before the relapse?
- On left shoulder you considered this a failure of the repair or a new lesion
- What will you do now in the left shoulder?
- If you considered a Repair of the Posterior Lesion will this affect the anteroinferior repair?





EXPERT COMMENTS



Philippe Hardy, MD
Boulogne, FRANCE

Do you consider this a traumatic dislocation or an Atraumatic one?

This is a true traumatic posterior dislocation unless we could compare the posterior Bankart lesion to the aspect of them on the imaging before the arthroscopic anterior stabilization.

Which Surgery will you suggest at first time before the relapse?

I always perform a Latarjet procedure in rugby players presenting chronic anterior instability even without any bone loss.

On left shoulder you considered this a failure of the repair or a new lesion?

If the imaging prior to the initial arthroscopic shoulder stabilization show a normal posterior labrum, I would consider this as a new lesion.

What will you do now in the left shoulder?

As this is a Rugby player and there are still some doubts, I would propose an Arthroscopic Latarjet + Posterior Bankart repair.

If you considered a Repair of the Posterior Lesion will this affect the anteroinferior repair?

Yes this why I add a Latarjet.

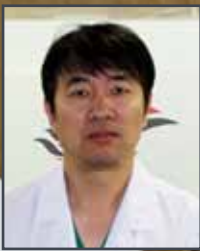


Guillermo Arce, MD
Buenos Aires, ARGENTINA

This is not a MDI case. The patient has hyper-laxity (a body pattern), plus traumatic events due to his contact sport. An arthroscopic approach is always better than bone blocks or Latarjet in order to reduce his capsular volume in patients with mild or moderate bone loss. Bankart repair with 4 or 5 double loaded suture anchors (big glenoid in a basketball player) with a huge capsular plication is the way to go. Double loaded anchors are key for Bankart reconstruction and adequate capsular tensioning. Postero- inferior capsular plication and rotator interval closure are additional techniques to achieve a “balanced capsular plication”. In the present scenario with 2 surgeries on the right and one on the left shoulder, I would recommend a strong rehabilitation program trying to avoid further surgery in this competitive athlete.



A Discussion on Shoulder Arthroscopy



Yon-Sik Yoo, MD
Seoul, KOREA

In my opinion, this case is extremely helpful to the shoulder surgeons. In fact, it is difficult to make a straight answer to this query.

However, the above case should be categorized as traumatic dislocation which has potential multi-directional instability. Actually, this category of patients are increasing and accounting for large proportion of patients who need anterior shoulder dislocation surgery. Particularly, this is more frequently observed in subject who faces arduous environment such as severe labor or military training without big trauma. Some of the patients intentionally induce dislocation to avoid such environment.

Performing surgical procedure is easy because of larger intra-articular space than usual case of anterior dislocation. Bankart and Hill Sach lesions are usually observed but not serious, meanwhile, height of posterior labrum is lost. Simple repair of Bankart lesion may have higher possibility of re-dislocation.

Hence, there should be an effort to recover the height of inferior and posterior labium which would reduce the volume of axillary pouch and eventually reduce the possibility of recurrence.



W. Jaap Willems, MD, PhD
Amsterdam, The Netherlands

The patient has a traumatic incident superimposed on his severe hyperlaxity. The trauma has led to a stretching of his already wide capsule.

It is extremely difficult to determine to which degree and which part of the capsule should be reefed. Basically these patients are very dependent on their proprioception and the more you operate on the capsule the more mechanoreceptors are damaged.

Essentially the question should be asked if this boy, with his congenital poor capsule, should go back to rugby after so many surgeries with so poor success.

I guess he will have a poor prognosis of whatever surgery will be performed.

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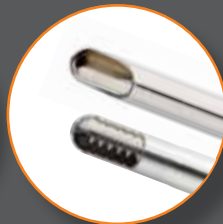
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