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June 18–June 21

# Primary ACL Reconstruction With Lateral Extra Articular Augmentation With Modified Lemaire Technique

Horacio F. Rivarola Etcheto, *Cristian Collazo,*  
*Marcos Meninato, Carlos Mendoza,*  
*Marcelo Libertini, Marcos Palanconi*





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## Disclosures:

- Dr Horacio Rivarola Etcheto, Buenos Aires, Argentina  
Arthrex Consultant



# Introduction:



- Anterolateral rotational instability after anterior cruciate ligament (ACL) reconstruction surgery may be due a number of reasons, including tunnel misplacement, meniscal root tears, ramp lesions, total or subtotal meniscectomies, or disruption of anterolateral soft tissue structures.
- There is a great variety of lateral extra-articular tenodesis (LET) procedures that have been described following the initial technique described by Lemaire in 1967.
- There is no formal consensus nor clear indications so as to perform a LET procedure in primary ACL reconstruction surgery.
- However, when the patients present a combination of specific risk factors, an additional procedure is recommended due to a higher risk of failure.
- If 1 or more of the following criteria are found, this team will combine a primary ALC reconstruction with a LET: Grade III Pivot Shift test (Explosive Pivot), high demand contact sport, associated Segond Fracture, generalized ligamentous laxity or genu recurvatum of  $>10^\circ$ , revision ACL surgery in the contra-lateral knee.



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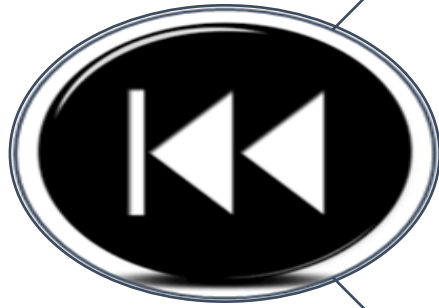
# Introduction:

Due to the lack of clear indications, major and minor criteria have been established to make a correct indication of modified Lemaire-type extra-articular tenodesis in primary ACL reconstruction and avoid plasty re-ruptures by achieving greater rotational control.



Major Criteria 2 points (except *)	Minor Criteria 1 point each
1. Grade III Pivot Shift	1. Generalized Hyperlaxity
2. Contact Sports	2. KT-1000 Diference of 8mm or more
3. Elite or High-Level Athlete	3. Chronic instability (6 or more Months)
4. Age: 25 y.o Or Less	4. Medial Meniscetomy and/or lateral meniscus Root tear.
5. ACL Revision * (5 points)	5. Contra lateral Instability
	6. BMI = 30 or more
	7. Segond Fracture
	8. Posterior Tibial slope 10° or more
	9. Severe Anterior Tibial Translation.

# Materials and Methods



Retrospective.  
40 Patients between 2017-2019  
Average follow up: 4 years.  
Primary ACL + Modified Lemaire  
33 Male  
7 Female



Average Age: 25 y.o.  
Range: 17-33



Sports  
Football, Rugby, Handball, Basket



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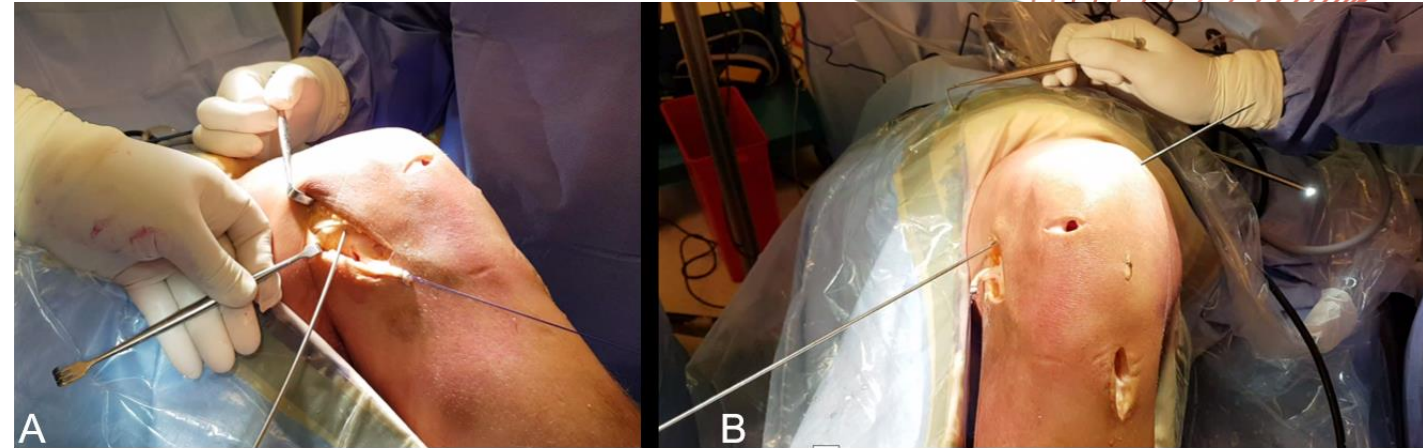
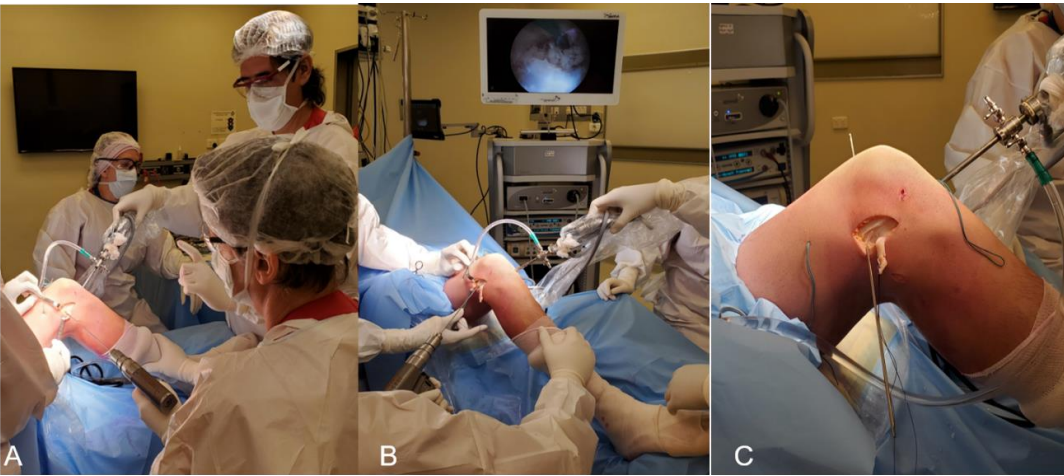


# Surgical Technique

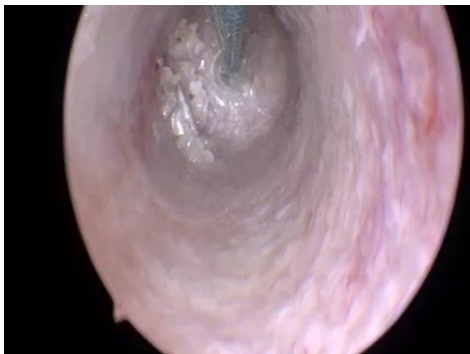


- ACL Femoral and tibial tunnels are made arthroscopically.
- Next open surgery, anterolateral approach, take a 1cm wide Iliotibial Band graft, its distal insertion is preserved in Gerdy's Tubercle, and it is detached at a proximal level at 9 cm.
- The Lateral Collateral Ligament (LCL) is located and passes under it.

# Surgical Technique



We locate the femoral point, proximal and posterior to the lateral epicondyle. A lateral femoral tunnel is made from distal to proximal ( $20^\circ$  or +) and posterior to anterior ( $20^\circ$  or +) under arthroscopic control and simultaneous direct vision, we check that there is no confluence of tunnels.



Arthroscopic graft passage, femoral and tibial fixation of Primary ACL Reconstruction



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# Surgical Technique

Arthroscopy

The Journal of Arthroscopic and Related Surgery



## Evaluating for Tunnel Convergence in Anterior Cruciate Ligament Reconstruction With Modified Lemaire Tenodesis: What Is the Best Tunnel Angle to Decrease Risk?

Simone Perelli, M.D. • Juan Ignacio Erquicia, M.D. • Maximiliano Ibañez, M.D. • ...

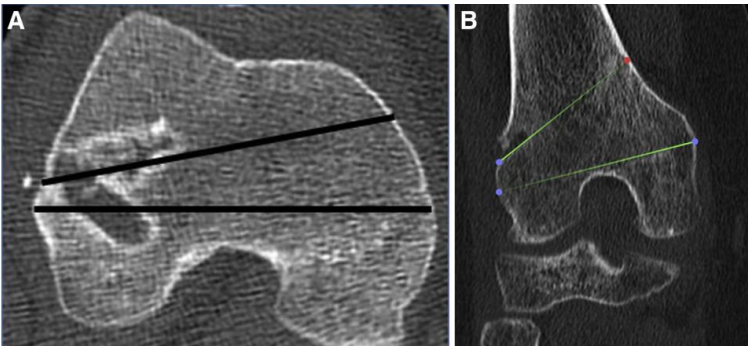
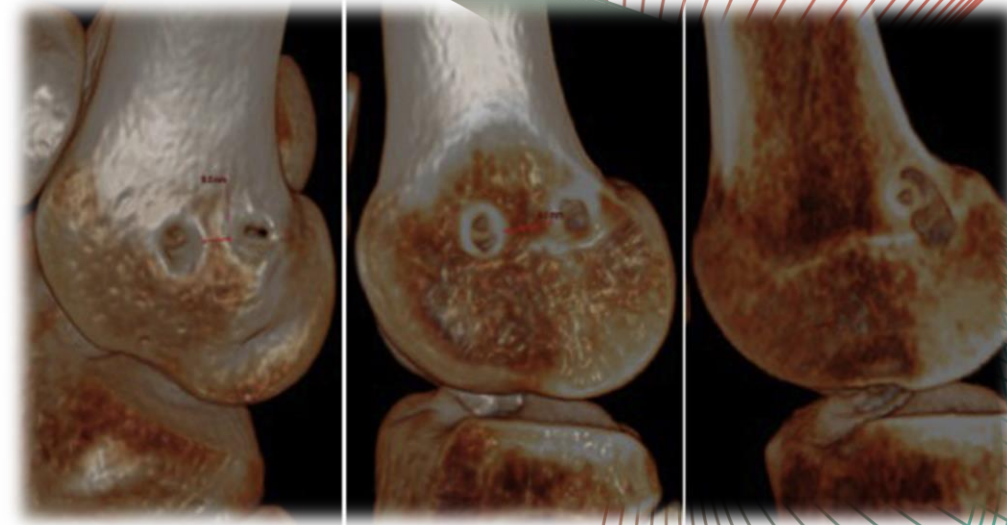
Pablo Eduardo Gelber, M.D. Ph.D. • Xavier Pelfort, M.D. Ph.D. • Juan Carlos Monllau, M.D., Ph.D. •

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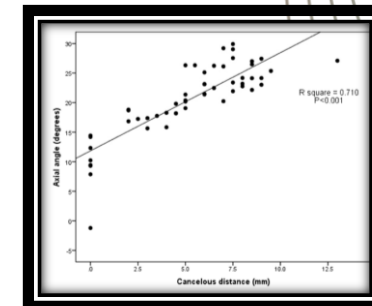
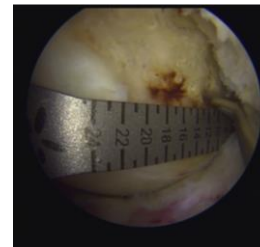
Not Safe Distance

Safe Distance

Tunnel Convergence



By aiming the femoral tunnel over 20° in the axial and coronal planes in the Lemaire tenodesis, convergence with the femoral tunnel for the ACL is avoided.



This is valid when:

- The anatomical technique is performed in the ACL reconstruction, performing the femoral tunnel with 115° knee flexion.
- The entry point of the femoral tunnel in Lemaire is 5-10 mm proximal to the lateral epicondyle.



# Surgical Technique

Next, the Iliotibial Band graft is passed through the lateral femoral tunnel.



Fixation with a 7x23mm Biocomposite screw in 30° flexion and neutral rotation.

Control of the pivot and external rotation was verified, with good graft tension.



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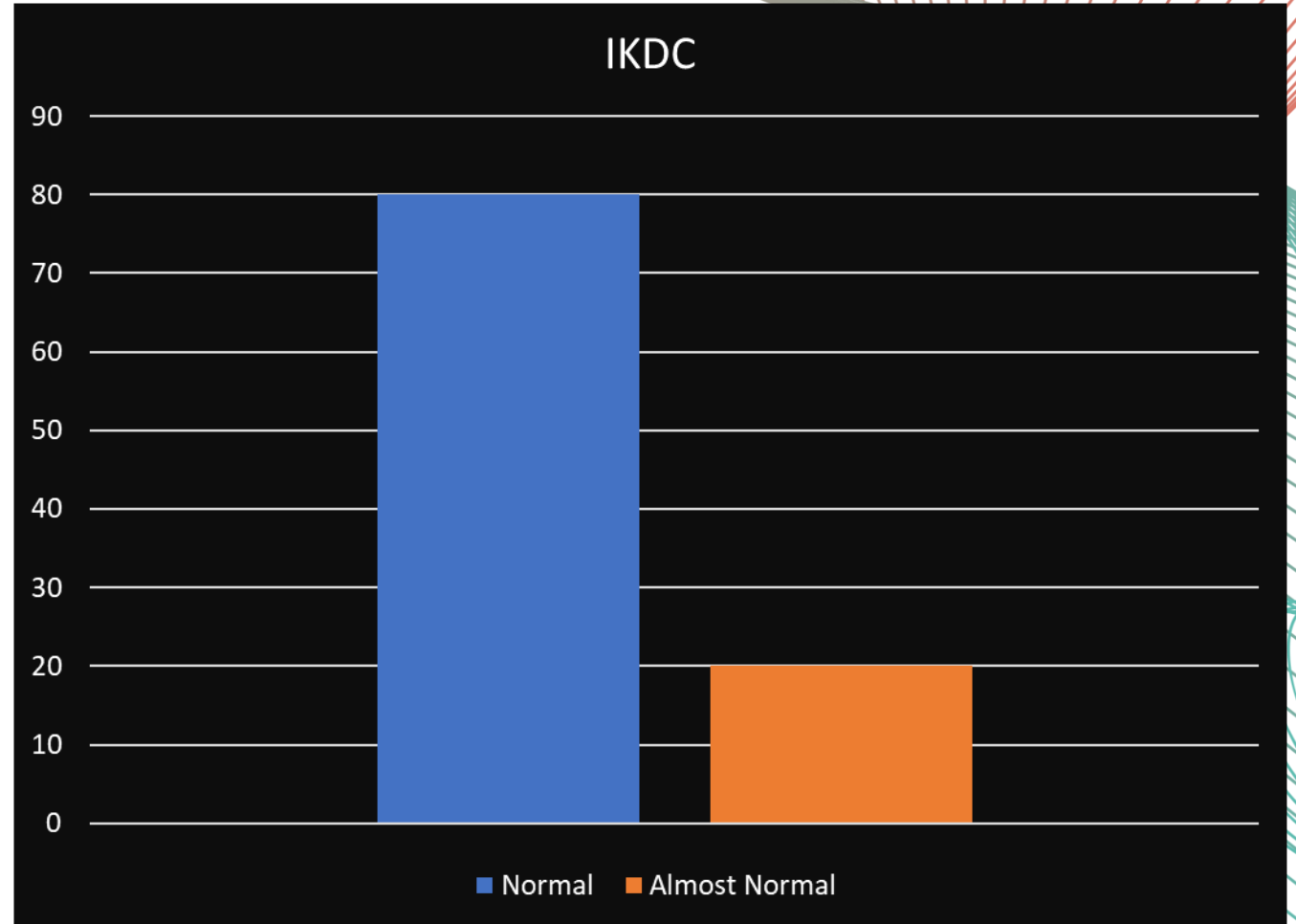


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# Results

- ✓ Patients were evaluated until discharge from treatment, average follow-up of 48 months.
- ✓ The clinical result evaluated with the IKDC scale showed 80% normal results, 20% almost normal results.
- ✓ Post-surgical rotational stability of 100% was achieved.
- ✓ 100% Return to sport.



No patient in this series underwent revision surgery



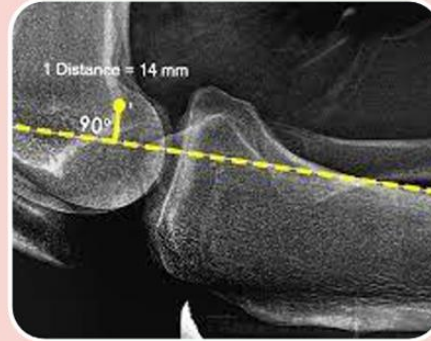
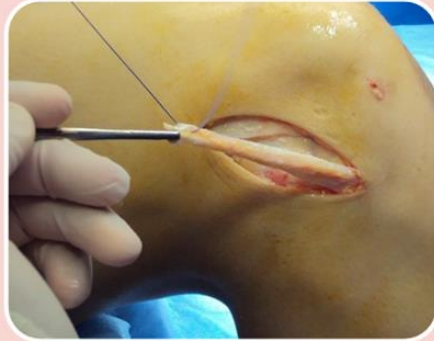
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# Discussion



With the advent of arthroscopic anterior cruciate ligament reconstruction, extra-articular techniques in knee instabilities had passed into the background.

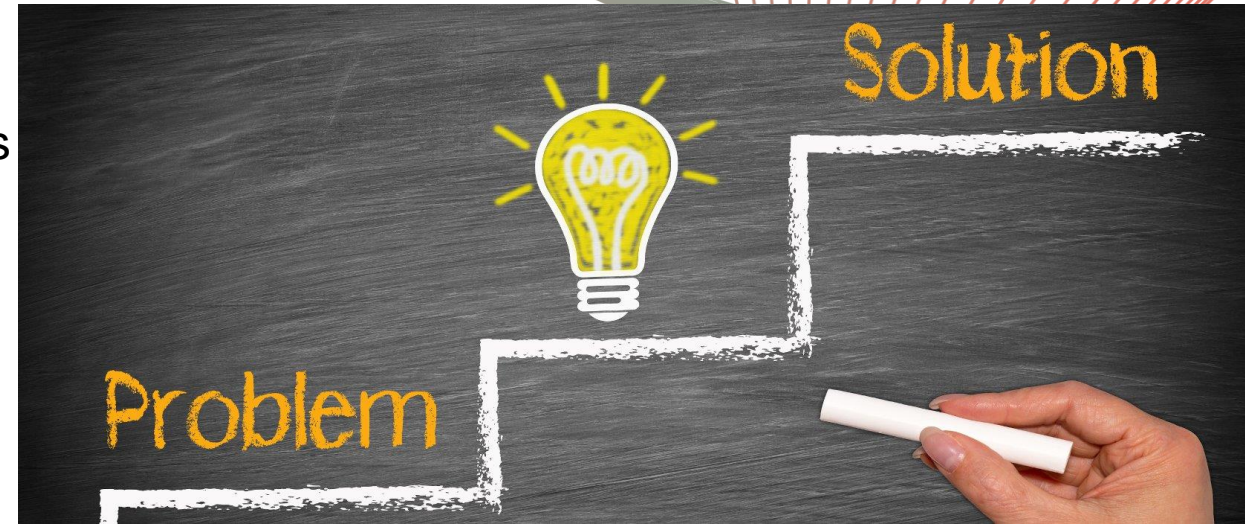
However, many surgeons are now associating a modified lateral tenodesis with ACL reconstruction to improve rotational stability in selected patients.

Chahla et al demonstrated in a robotic study that both procedures present similar results, decreasing both the anterior translation of the tibia and the residual rotational instability to values similar to those of a healthy knee.

Engebretsen et al reported that by associating a LET procedure with an arthroscopic ACL reconstruction, the forces acting on the ACL graft decreased by up to 43% when compared to an ACL isolated reconstruction.

# Conclusion

- Adding a Lemaire-type extra-articular tenodesis improves anterolateral rotational stability in primary ACL reconstruction, ACHIEVING:
  1. Better graft survival.
  2. Lower rate of re-ruptures.
  3. It is NOT associated with a higher rate of complications.



This combined technique is highly recommended in the following situations:

- Grade III Pivot Shift test (explosive Pivot Shift),
- High demand sports activity,
- Associated Second Fracture,
- Generalized ligamentous laxity or genu recurvatum of  $>10^\circ$ ,
- Revision ACL surgery in the contra-lateral knee.

# References:

1. Schindler OS. Surgery for anterior cruciate ligament deficiency: A historical perspective. *Knee Surg Sports Traumatol Arthrosc.* 2012; 20:5-47.
2. Bernholt, D. L., Kennedy, M. I., Crawford, M. D., DePhillipo, N. N., & LaPrade, R. F. Combined Anterior Cruciate Ligament Reconstruction and Lateral Extra-Articular Tenodesis. *Arthroscopy Techniques.* 2019.
3. Geeslin, A. G., Moatshe, G., Chahla, J., Kruckeberg, B. M., Muckenhirn, K. J., Dornan, G. J., LaPrade, R. F. Anterolateral Knee Extra-articular Stabilizers: A Robotic Study Comparing Anterolateral Ligament Reconstruction and Modified Lemaire Lateral Extra-articular Tenodesis. *The American Journal of Sports Medicine,* 2017.
4. Lemaire M. Rupture ancienne du ligament croisé antérieur du genou; fréquence, clinique, traitement (46 cas). *J Chirurgie* 1967:311-20
5. Vundelinckx, B., Herman, B., Getgood, A., & Litchfield, R. (2017). Surgical Indications and Technique for Anterior Cruciate Ligament Reconstruction Combined with Lateral Extra-articular Tenodesis or Anterolateral Ligament Reconstruction. *Clinics in Sports Medicine,* 36(1)
6. Thauvat, M., Clowez, G., Saithna, A., Cavalier, M., Choudja, E., Vieira, T. D., Sonnery-Cottet, B. Reoperation Rates After Combined Anterior Cruciate Ligament and Anterolateral Ligament Reconstruction: A Series of 548 Patients From the SANTI Study Group With a Minimum Follow-up of 2 Years. *The American Journal of Sports Medicine,* 2017.
7. Herbst E, Hoser C, Tecklenburg K, et al. The lateral femoral notch sign following ACL injury: frequency, morphology and relation to meniscal injury and sports activity. *Knee Surg Sports Traumatol Arthrosc.* 2015;23(8):2250-2258
8. Lording TD, Lustig S, Servien E, et al. Lateral reinforcement in anterior cruciate ligament reconstruction. *Sports Med Arthrosc Rehabil Ther Technol* 2014;1:3–10
9. Prodromos CC, Joyce BT, Shi K, et al. A meta-analysis of stability after anterior cruciate ligament reconstruction as a function of hamstring versus patellar tendon graft and fixation type. *Arthroscopy* 2005;21(10):1202
10. Mohtadi N. Function after ACL reconstruction: a review. *Clin J Sport Med* 2008;18(1):105–6
11. Mathew, M., Dholander, A., & Getgood, A. (2018). Anterolateral Ligament Reconstruction or Extra-Articular Tenodesis. *Clinics in Sports Medicine,* 37(1)
12. Devitt BM, Bouguennec N, Barfod KW, Porter T, Webster KE, Feller JA. Combined anterior cruciate ligament reconstruction and lateral extra-articular tenodesis does not result in an increased rate of osteoarthritis: a systematic review and best evidence synthesis. *Knee Surg Sports Traumatol Arthrosc.* 2017.
13. Dejour D, Vanconcelos W, Bonin N, Saggin PR. Comparative study between monobundle bone-patellar tendon-bone, double bundle hamstring and mono-bundle bone-patellar tendon-bone combined with a modified
14. Inderhaug E, Stephen JM, Williams A, et al. Biomechanical comparison of antero-lateral procedures combined with anterior cruciate ligament reconstruction. *Am J Sports Med* 2017;45(2):347–54.
15. Horacio F. Rivarola Etcheto, Jesuán Zordán, Cristian Collazo, Marcos Palanconi, Emiliano Alvarez Salinas, Gonzalo Escobar, Mauricio Chiotta Romano. Ligamento Anterolateral de Rodilla. Reconstrucción Anatómica con Técnica Mini Invasiva de Doble Incisión. *ARTROSCOPIA | VOL. 23, Nº3 : 132-135 | 2016*

