A High Level Of Scientific Evidence Is Available To Guide Treatment Of Primary Shoulder Stiffness

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SIAGASCOT

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Journal of Experimental Orthopaedics (associate editor)

Roadmap

Goals & Methods — A consensus on primary shoulder stiffness: why & how

Results — A summary of the SIAGASCOT Consensus

Focus on: PT role — Physical therapy, electotherapy modalities, injections: *en detail*

Relevance — Practical relevance

Timeline

Identify causes and risk factors for shoulder stiffness (2017, updated 2024)

Review available treatments & recommendations (2018)

Investigate surgeon practice patterns in Italy
regarding treatment of primary shoulder stiffness (2019)

Create consensus-based recommendations
for the treatment of primary shoulder stiffness (2023)

SIAGASCOT position paper

Methods: preliminary work

Literature review 2019

- randomized controlled trials
  - results of shoulder stiffness treatment.

→ Identification of controversial points (literature)

- modalities of physical therapy
- indication for oral corticosteroid
- indication and frequency for injective corticosteroid
- technique and site of injection
- indication, timing and technique for surgery.

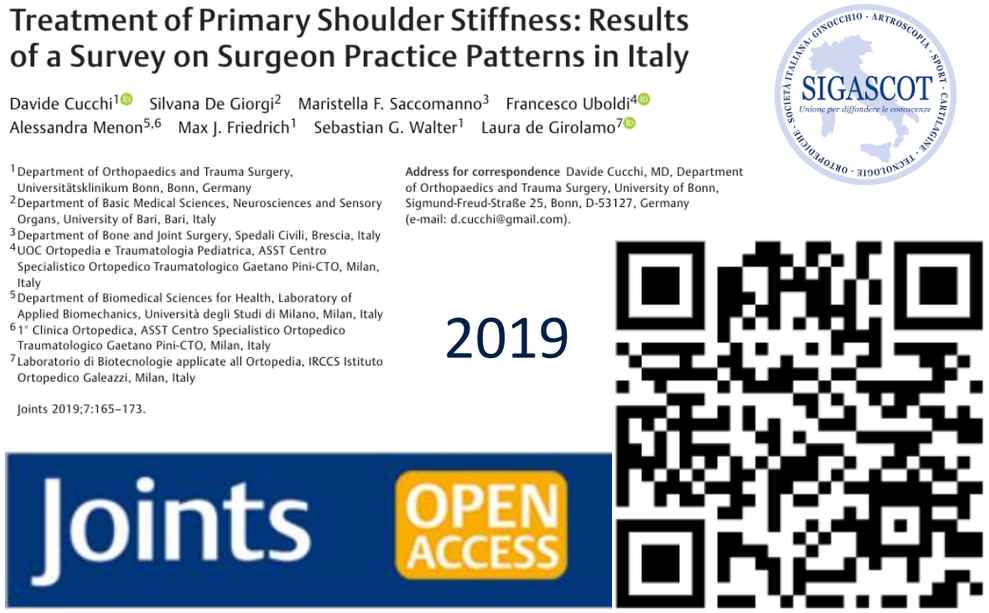
Methods: preliminary work

Creation of a survey (14 questions)

Administration to approx. 800 members (x 3 reminders) of the SIGASCOT society

204 respondents

→ Identification of controversial points (clinical practice)



Treatment of Primary Shoulder Stiffness: Results of a Survey on Surgeon Practice Patterns in Italy

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2019

Joints OPEN ACCESS

Consensus development (DELPHI)

Formal consensus process:

steering + literature group (18), rating group (20), peer-review group (38)

HAS
HAUTE AUTORITÉ DE SANTÉ

Structure & Team

SIAGASCOT Shoulder Stiffness Consensus

Davide Cucchi
Laura de Girolamo

↓

Steering & Literature Group (18)

↑

Chiara Formigoni

Fabrizio Brindisino	**Andrea Lisai**
Vincenzo Candela	**Barbara Melis**
Alessandro Carrozzo	**Alessandra Menon**
Riccardo Compagnoni	**Laura Mangiavini**
Silvana de Giorgi	**Mattia Radici**
Andrea De Vita	**Roberto Padua**
Luca dei Giudici	**Antonello Pannone**
Raymond Klumpp	**Francesco Rosa**

→

STATEMENTS

↓

Rating group (20)

↓

Peer-Review (38)

↓

Board approval

↓

Publication & Diffusion

Logistic support & panels coordination: Antongiulio Marmotti – Arianna Carnevale – Francesco Rosa

Consensus development (DELPHI)

Formal consensus process methodology:

Steering + literature group

Literature update Feb. 2022

16 questions → 16 statements → evidence grading (A-D)

∟ rating (disagree – agree, 1-9)

Steering + literature group (18)

Grade: mostly A1/A2-Grades

→ high level of evidence available

Rating group (20)

Average rating (2nd round) = 8.4, all > 8

→ consensus achieved

Peer-review group (38)

→ approval & diffusion

Question	Topic	Statement	Best evidence	Scientific grade	Rating score (median)
1	Diagnostic tests		Case series	C	9.0
2	Additional tests	S1	Meta-analysis	A	9.0
		S2	Meta-analysis	A	
		S3	Expert opinion	D	
3	Physiotherapy	S1	Meta-analysis	A	9.0
		S2	Multiple randomised controlled trials	A	
		S3	Multiple randomised controlled trials	A	
		S4	Multiple randomised controlled trials	A	
4	Electrophysical agents	S1	Multiple randomised controlled trials	A	8.0
		S2	Multiple randomised controlled trials	A	
		S3	Multiple randomised controlled trials/low-level comparative studies	A/C	
5	Oral corticosteroids		Multiple randomised controlled trials	A	8.0
6	Other oral medication	S1	Multiple randomised controlled trials	A	8.0
		S2	Single randomised controlled trial	A	
		S3	Single randomised controlled trial/ comparative studies, not level I	A/B	
7	Corticosteroid injections		Meta-analysis	A	9.0
8	Injection technique		Meta-analysis	A	9.0
9	Platelet-rich plasma	S1	Multiple randomised controlled trials	A	8.0
		S2	Prospective cohort studies	B	
10	Local anaesthetics and hyaluronic acid	S1	Single randomised controlled trial	A	8.0
		S2	Multiple randomised controlled trials/ case series	A/D	
11	Nerve blocks	S1	Multiple randomised controlled trials	A	8.0
		S2	Single randomised controlled trial	A	
12	Alternative therapies		Multiple randomised controlled trials	A	8.0
13	Hydrodilatation		Multiple randomised controlled trials	A	8.0
14	Manipulation under anaesthesia		Multiple randomised controlled trials	A	8.0
15	Surgery—indications		Single randomised controlled trial	A	9.0
			Comparative studies, not level I	B	
16	Surgery—techniques		Comparative studies, not level I	B	9.0

Question	Essential summary of the answer
1. What diagnostic tests are necessary?	Primarily clinical diagnosis; radiographic examination to rule out chronic other conditions. Follow-up imaging are not necessary.
2. What additional tests are recommended?	Magnetic resonance imaging is useful in uncertain cases. Ultrasound can be useful, if performed by specialised medical personnel. Blood tests are not necessary; advisable to rule out thyroid disorders and diabetes in patients with relevant history or risk factors.
3. What type of physiotherapy is recommended?	Multimodal approach (therapeutic exercise, stretching, joint mobilisation), including scapulothoracic girdle and rotator cuff exercises and stretching up to tolerable pain. Corticosteroid injections combined with physiotherapy provide additional benefit.
4. What electrophysical agents are recommended?	Extracorporeal shockwave therapy can be considered as alternative therapy to pharmacological treatment. Laser therapy can improve pain and disability, does not alter joint stiffness. Not sufficient evidence yet available for other electrophysical agents.
5. Are oral corticosteroids indicated?	Oral corticosteroids are more effective than placebo, nevertheless corticosteroid injections are significantly superior.
6. What other medications are recommended?	Nonsteroidal anti-inflammatory drugs safe and effective.
7. Are corticosteroid injections recommended?	Intra-articular injections are safe and effective and represent the recommended first-line treatment. One to three injections are recommended from the time of diagnosis, at weekly or biweekly intervals.
8. Is there a superior injection technique?	Glenohumeral joint injections, with anterior access based on anatomical landmarks or posterior access under ultrasound guidance.
9. Are platelet-rich plasma (PRP) injections indicated?	PRP injections are safe and well-tolerated, but there is not sufficient evidence yet to compare them with corticosteroid injections.
10. Are local anaesthetic and hyaluronic acid injections indicated?	Anaesthetic injections can immediately relieve pain during physiotherapy, the number of injections should be low due to concerns of chondral toxicity. Hyaluronic acid as a sole infiltrative procedure is not superior to other treatments.
11. What role do nerve blocks play?	Suprascapular nerve block has beneficial effects, superior to corticosteroid injection or physiotherapy alone. Specialised medical personnel is required to perform it, therefore it should be considered as a second-line treatment.
12. What role do alternative medicine approaches play?	Alternative medicine approaches seem to be safe and effective, but no high-level studies comparing with corticosteroid-based treatments. Not recommended.
13. Is hydrodilatation indicated?	No high-level studies isolated the effect of hydrodilatation from other associated procedures. Not recommended.
14. Is manipulation under anaesthesia or nerve block indicated?	Manipulation under anaesthesia or nerve block provide no benefits compared to physiotherapy or corticosteroid injection. Not recommended.
15. In which cases is surgical treatment indicated?	Surgery is not indicated as a first-line treatment. An evidence-based conservative treatment period of 3–6 months Three is recommended before considering surgical intervention in cases of treatment failure.
16. Is there a superior surgical technique?	Anterior–inferior capsular release. There is no consensus on additional procedures.

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Knee Surgery, Sports Traumatology, Arthroscopy WILEY

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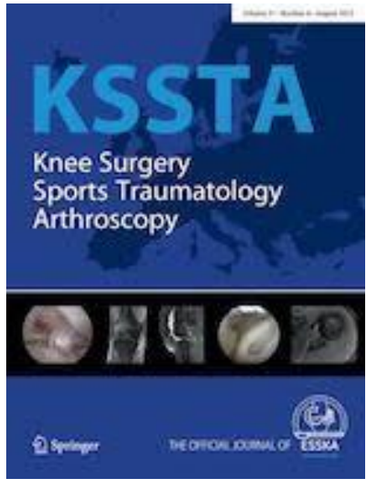

Short summary and full-length documents: siagascot-orto.com

3. What type of physiotherapy is recommended?

Multimodal approach (therapeutic exercise, stretching, joint mobilisation), including scapulothoracic girdle and rotator cuff exercises and stretching up to tolerable pain. Corticosteroid injections combined with physiotherapy provide additional benefit.

Patient education
- To the pathology (duration, stages, progression & expectations, therapeutic path)
- About ADL changes

→ ↓ patient anxiety
- Shoulder stiffness linked to anxiety & depression: delay in diagnosis = frustration
- Mismatch between patients' and clinicians' perception of the impact = uncertainty
- Lack of a definitive diagnosis + unclear pathways for management = anxiety

→ ↑ functional results, ↑ subjective improvement of symptoms

Cooperation, communication and discussion: align treatment goals

simple and clear strategies → customized treatment program

Jones, 2013; King and Hebron, 2022; Millar, 2022; Brindisino, 2022

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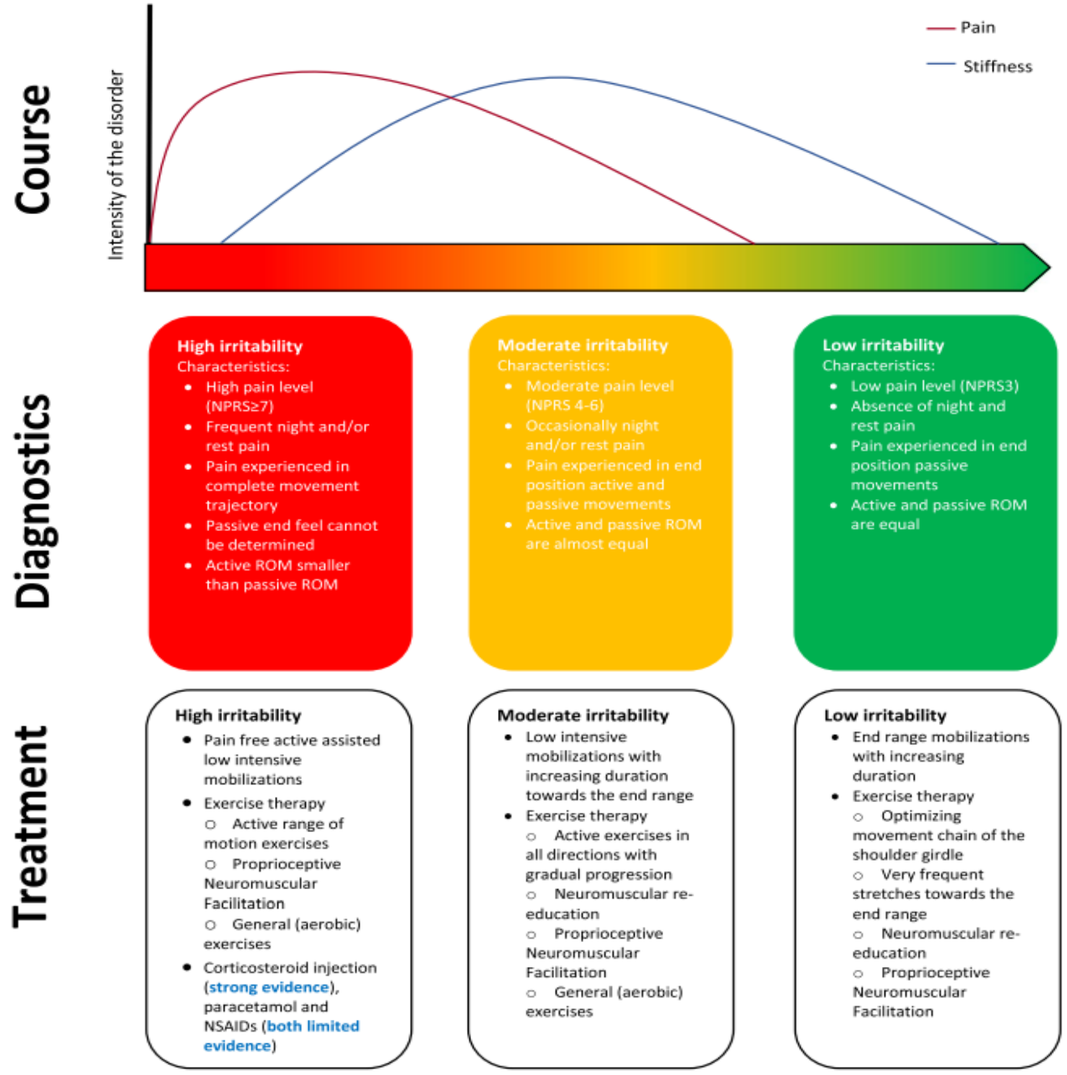
Align treatment goals

→ treatment adjusted to
- disease phase
- tissue irritability level
  "ability of the affected tissue to cope with stress"

→ General treatment
- Patient education (**moderate evidence**), guiding and supervising patient.
- Mobilizations (**weak/strong evidence**)
- Exercise therapy (**moderate/strong evidence**)

→ irritability-guided interventions →



Kelley, 2009; Wong, 2016; Mertens, 2022

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Therapeutic exercise

- ↑ ROM, ↑ function, ↓ disability, ↓ pain; little to no difference between different programs
- activity-oriented: more effective than conventional (↓ pain, ↑ performance of ADL)
- + scapulothoracic exercises: ↑ ROM, ↓ pain
- + rotator cuff strengthening: ↑ ROM
- + excentric exercises: ↑ ROM, ↑ strength, ↓ pain
- Mirror therapy? (↑ ROM, ↑ function, ↓ pain)

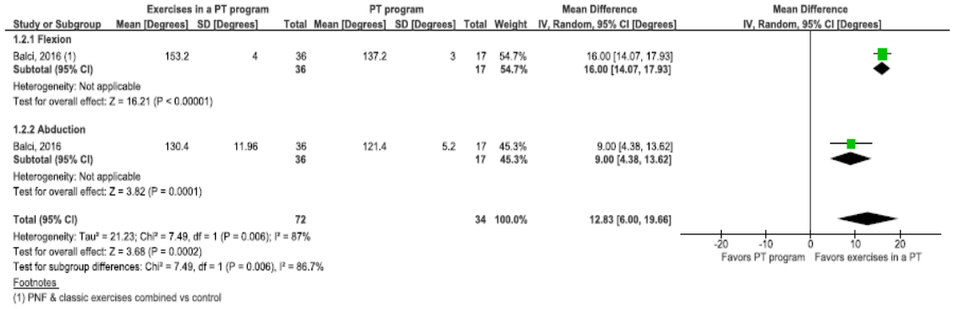

Fig 7 Pooled results of program of interventions by physical therapists (PT), including exercise, compared with a program of interventions by therapist without exercise for *AROM*.

Jain, 2014; Rawat, 2016; Çetin Başkaya, 2018, Horst, 2017; Tedla, 2019; Mertens, 2021; Kim, 2021Karnawat, 2023; Kurashina, 2023; Wang, 2023

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Stretching

- ↑ ROM
- without or with devices
- proprioceptive NM facilitation
- not enough evidence to determine ideal dose: Total End Range Time (TERT)

TERT = total amount of time that the joint is positioned at its end range

→ should increase from moderate to low irritability

- Possible help of home exercise, SMS-reminders, app-based programs (↑ compliance)

TABLE 1 IRRITABILITY CLASSIFICATION AND TREATMENT STRATEGIES BASED ON IRRITABILITY LEVEL*

	High Irritability	Moderate Irritability	Low Irritability
History and examination findings	High pain (≥7/10) Consistent night or resting pain Pain prior to end of ROM AROM less than PROM, secondary to pain	Moderate pain (4-6/10) Intermittent night or resting pain Pain at end of ROM AROM similar to PROM	Low pain (≤3/10) No resting or night pain Minimal pain at end ROM with overpressure AROM same as PROM
ROM/stretch	Short-duration (1-5 seconds), pain-free passive AAROM	Short-duration (5-15 seconds) passive AAROM to AROM	End range/overpressure, increased duration, cyclic loading
Manual techniques	Low-grade mobilization (grades I-II)	Low- to high-grade mobilization (grades I-IV)	High-grade mobilization, sustained hold (grades III-IV)

Abbreviations: AAROM, active assisted range of motion; AROM, active range of motion; PROM, passive range of motion; ROM, range of motion.
**Adapted with permission from Kelley et al.*[23]

Kelley, 2009; Celik, 2016; Chen, 2017; Choi, 2018; Dueñas, 2019 Tedla, 2016; Wanderley, 2019; Teytelbaum, 2024

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Multimodal approach (therapeutic exercise, stretching, joint mobilisation, including scapulothoracic girdle and rotator cuff exercises and stretching up to tolerable pain. Corticosteroid injections combined with physiotherapy provide additional benefit.

Joint mobilisation

- ↑ ROM (abduction), ↑ function, ↓ pain
- not enough evidence to determine ideal dose of different techniques
- no high-level evidence to support or refute a <u>difference between techniques</u>
  - high-grade > low-grade mobilization
  - end-range > mid- range mobilization
  - ↑ posterior direction
- painful (‘‘reasonable’’ pain threshold, >6/10 NRS)
  (NOT in patients in high irritability stage)

Figure 9. Program treatment that included joint mobilization techniques versus a control group for the questionnaire Constant-Murley.

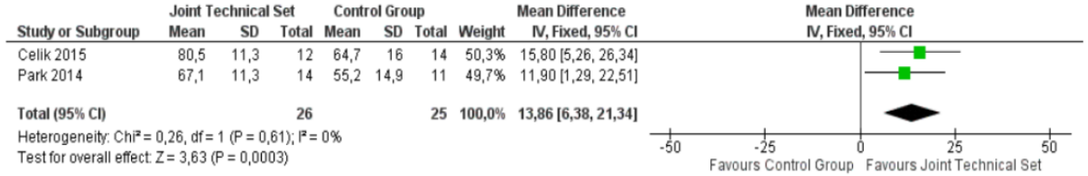
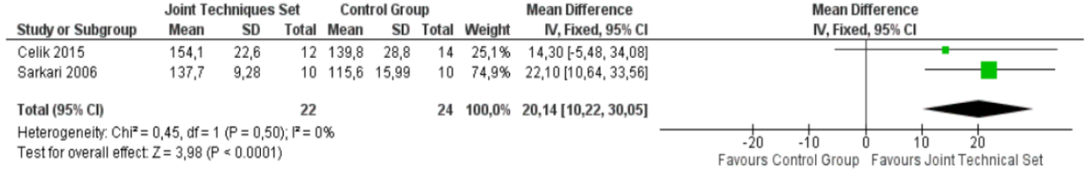


Figure 8. Program treatment that included joint mobilization techniques versus a control group for the range of glenohumeral abduction.



Vermeulen, 2006; Gleyze 2011; Yang 2012, Gutiérrez Espinoza, 2015; Noten, 2016; Zavala-González, 2018; Venturin, 2021; Kubuk 2023, Lee 2023

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Intra-articular corticosteroid injections

- = gold standard medical treatment
- 1-3 injections every 1-2 weeks, begin immediately after diagnosis
- ultrasound guided injection if possible
- anterior approach landmark-based, posterior always with ultrasound
- additional benefits when combined with physiotherapy

Koh, 2016; Sun, 2017; Brealey, 2020; Venturin, 2021

4. What electrophysical agents are recommended?	Extracorporeal shockwave therapy can be considered as alternative therapy to pharmacological treatment. Laser therapy can improve pain and disability, does not alter joint stiffness. Not sufficient evidence yet available for other

Extracorporeal shockwave therapy

- alternative to pharmacological treatment <u>for diabetic patients</u>
  (poorly controlled blood glucose levels, contraindications to corticosteroid treatments)
- superior to other electrophysical agents, not to steroid injections → not as 1st choice!

Laser therapy

- low-level laser therapy + combination with capsular stretching: ↓ pain, ↑ function
  <u>does not significantly alter joint stiffness</u>
- high-level laser therapy: ↓ pain VS placebo *(low level of evidence)*

Chen, 2014; Page, 2014; Ip, 2015; Kim, 2015; Atan, 2017; Muthukrishnan, 2019; El Naggar, 2020; Zhang, 2022; Saldiran, 2022

4. What electrophysical agents are recommended?	Extracorporeal shockwave therapy can be considered as alternative therapy to pharmacological treatment. Laser therapy can improve pain and disability, does not alter joint stiffness. Not sufficient evidence yet available for other

Ultrasound therapy, thermotherapy, cryotherapy, transcutaneous electrical nerve stimulation, pulsed electromagnetic fields, iontophoresis

- → no sufficient scientific evidence for their beneficial effects
- → not recommended

Leung, 2008; Ma, 2013; Page, 2014; Elhafez, 2016; Balci, 2018; Sung, 2022;

Several approaches proposed, **high-level evidence available**

Consensus achieved on main topics, controversial points persist

Treatment of shoulder stiffness
- *pain reduction*
- *ROM restoration*
- *functional regain*
- *shortening of symptoms duration*

Physiotherapy + intraarticular corticosteroid injections = 1st choice treatment!

→ *Education, Exercise + Stretching + Mobilisation*

References & Team

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