











APTA CSM Hand and Upper Extremity Academy: Frozen Shoulder







The pathophysiology associated with primary (idiopathic) frozen shoulder: A systematic review

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- Pathological changes in the anterior shoulder joint capsule and related structures
- Imaging identified pathological changes occurring in the coraco-humeral ligament, axillary fold and rotator interval.
- Obliteration of the sub-coracoid fat triangle also appeared to be pathognomonic.
- Histological studies inconclusive but suggests immune, inflammatory and fibrotic changes are associated with primary frozen shoulder.

Ryan V, Brown H, Minns Lowe CJ, Lewis JS. The pathophysiology associated with primary (idiopathic) frozen shoulder: A systematic review. BMC musculoskeletal disorders. Aug 15 2016;17(1):340.





Stage 1		
Duration of symptoms: 0 to 3 mo	nths	
Pain with active and passive ROM	L. C.	
Limitation of forward flexion, abd	uction, internal rotation, external rotation	
Examination with the patient und	er anesthesia: normal or minimal loss of ROM	
Arthroscopy: diffuse glenohumera	al synovitis, often most pronounced in the anterosuperior capsule	
Pathologic changes: hypertrophic	, hypervascular synovitis, rare inflammatory cell infiltrates, normal underlying capsule	
Stage 2: Freezing Stage		
Duration of symptoms: 3 to 9 mo	nths	
Chronic pain with active and pass	ive ROM	
Significant limitation of forward fl	exion, abduction, internal rotation, external rotation	
Examination with the patient und	er anesthesia: ROM essentially identical to ROM when patient is awake	
Arthroscopy: diffuse pedunculate	d synovitis (tight capsule with rubbery or dense feel on insertion of arthroscope)	
Pathologic changes: hypertrophic formation in the underlying ca	, hypervascular synovitis with perivascular and subsynovial scar, fibroplasias and scar psule	
* Reprinted with permission 2000;372:95-109.	n from Hannafin JA, Chiaia T. Adhesive Capsulitis. Clin Ortho Rel Res.	



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Gross visual findings during arthroscopic surgery

- Abnormal villous fronding of the synovium
- Highly vascular: thickened scarring spreading across the rotator interval
- Synovitis between biceps and subscapularis
- Patchy, vascular, matted area of granulation tissue around origin of LH biceps and into the subscapularis recess



unker, Ann R Coll Surg Engl.1997, Esch, J Shid Elbow Surg, 1994, Segmuller, J Shid Elbov urg, 1995, Wiley, Arthroscopy, 1991, Uitvligt, Arthroscopy, 1993



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Physical Therapy		
 <u>Stretching at later stages</u> Done to remodel collagen matrix TERT (Total End Range Time) Frequency x Duration = TERT; e.g., 10 min, 3x/day = 30 min of TERT 	McClure PW, Flowers KI Treatment of limited should motion using an elevation splir Physical therapy, 24 1992;72(1):57-6 McClure PW, Blackburn LI Dusold C. The use of splints the treatment of joint stiffnes biologic rationale and a algorithm for making clinic	
 Start at 30 minutes, recommended 60 minutes/day Adjust frequency, duration and intensity (pain tolerance) Increase as irritability decreases 	decisions. Physical therapy. De 1994;74(12):1101-110 Kelley MJ, McClure PW, Legg BG. Frozen shoulder: evident and a proposed model guidir rehabilitation. J Orthop Spor Phys Ther. Feb 2009;39(2):13 14	
 Emphasis on rotator interval (anterior) and CHL No standardized/accepted durations/frequencies or intensities 	Kelley MJ, Shaffer MA, Kul JE, et al. Shoulder pain ar mobility deficits: adhesin capsulitis. J Orthop Sports Phy Ther. May 2013;43(5):A1-3	
Stress/Strain models suggest 30 minutes?		















	Constant score			
Time (mo)	Supervised neglect group (n = 45)	Physical therapy group (n = 32) S	ignificanc	
0	28.60 (8.64)	29.97 (8.46)	.492	
3	55.87 (14.26)	39.50 (8.45)	.000*	
6	63.31 (15.00)	47.91 (7.51)	.000*	
9	69.96 (15.44)	54.59 (7.89)	.000*	
12	76.71 (13.60)	58.97 (8.79)	.000*	
15	81.20 (13.45)	65.06 (11.12)	.000*	
18	86.82 (14.41)	70.69 (12.47)	.000*	
21	87.80 (12.80)	76.75 (14.41)	.001†	
24	88.78 (11.26)	79.56 (16.09)	.004†	

Patients with Constant score \geq 80 (%)			
ime no)	Supervised neglect group (n = 45)	Physical therapy group (n = 32)	
	0	0	
	2	0	
	16	0	
	22	0	
	64	0	
	78	16	
3	78	31	
	84	50	
	89	63	





High Irritability	Moderate Irritability	Low Irritability	
High pain (≥7/10)	Moderate pain (4-6/10)	Low pain (≤3/10)	
Consistent night or resting pain	Intermittent night or resting pain	No resting or night pain	
High disability on DASH, ASES, PSS	Moderate disability on DASH, ASES, PSS	Low disability on DASH, ASES, PSS	
Pain prior to end ROM	Pain at end ROM	Minimal pain at end ROM with overpressur	
AROM less than PROM, secondary to pain	AROM similar to PROM	AROM same as PROM	
Abbreviations: AAROM, activ American Shoulder and Elbox Questionnaire; PROM, passiv	ve assisted range of motion; AROM, v Surgeons Score; DASH, Disabilitie ve range of motion; PSS, Penn Shoul	active range of motion; ASES, s of the Arm, Shoulder and Hand der Score; ROM, range of motion.	

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High Irritability Modalities: • Heat for pain modulation • Electrical stimulation for pain	Moderate Irritability Modalities: • Heat for pain modulation as needed • Electrical stimulation for pain	Low Irritability Self-care/home management training: • Patient education on progression to performing high-demand functional	TABLE 4	Tre. Based	ATMENT STRATE ON IRRITABILIT	GIES Y LEVEL
modulation Self-care/home management training:	Self-care/home management training: • Patient education on progressing	Manual therapy: • End-range joint mobilization		High Irritability	Moderate Irritability	Low Irritability
 Patient education on positions of comfort and activity modifications to limit tissue inflammation and pain 	activities to gain motion and function without producing tissue inflammation and pain	procedures, high amplitude and long duration of procedures into tissue resistance	Modalities	Heat/ice/electrical stimulation	Heat/ice/electrical stimulation	
Manual therapy: • Low-intensity joint mobilization	Manual therapy: • Moderate-intensity joint mobilization	Stretching exercises: • Stretching exercises, progressing the	Activity modification	Yes	Yes	
procedures in the pain-free accessory ranges and glenohumeral positions Mobility exercises: • Pain-free passive ROM exercises	procedures, progressing amplitude and duration of procedures into tissue resistance without producing posttreatment tissue inflammation	duration of the stretches into tissue resistance without producing posttreatment tissue inflammation and associated pain	ROM/stretch	Short-duration (1-5 s), pain- free, passive AAROM	Short-duration (5-15 s), passive, AAROM to AROM	End range/overpressure, increased-duration, cyclic loading
 Pain-free active assisted ROM exercises 	and associated pain Stretching exercises: Gentle to moderate stretching exercises progressing the intentity	Neuromuscular re-education: Procedures to integrate gains in mobility into normal scapulohumeral mount during performance of the	Manual techniques	Low-grade mobilization	Low- to high-grade mobilization	High-grade mobilization/ sustained hold
	and duration of the stretches into tissue resistance without producing postfreatment tissue inflammation	activities performed by the patient during his/her functional and/or recreational activities	Strengthen			Low- to high-resistance en ranges
	and associated pain		Functional activities		Basic	High demand
	Procedures to integrate gains in mobility into normal scapulohumeral		Patient education	+	+	+
	movement while performing reaching activities		Other	Intra-articular steroid injection		
			Abbreviations: AAR	OM. active assisted range of m	otion: AROM. active ran	ge of motion,

























Laterality: Frozen Shoulder				
Test	Left	Right		
2-Point Discrimination (mm)	40	58*		
Hand Laterality Accuracy (%)	70*	50*		
Hand Speed (seconds)	2.2	4.2*		
Shoulder Laterality Accuracy (%)	80	60*		
Shoulder Speed (seconds)	2.5	4.9*		
* Abnormal ref EE. McDeviti AW, Low A, Puertedura EJ, en PE. Use of Pain Nauroscience Ecuation. Buoministica, es docide Muto Imagery in an speedic and sports physical therapy. Mar Weil '147-144				



















































Study	Total number of subjects presenting with adhesive capsulitis of the shoulder	Female subjects presenting with adhesive capsulitis of the shoulder n (%)		
Ryans et al, 2005 [35]	80	46 (57.5)		
Carette et al, 2003 [34]	93	55 (59.1)		
Buchbinder et al, 2004 [33]	49	35 (71.4)		
Arslan & Çeliker, 2001 [32]	20	10 (50.0)	60.3%	
Dierks & Stevens, 2004 [28]	77	40 (51.9)		
Van der Windt et al, 1998 [30]	109	58 (53.2)		
Vermeulen et al, 2006 [27]	100	66 (66.0)		
Griggs et al, 2000 [26]	75	58 (75.3)		





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What do patients want from us?

- Clear diagnosis
- Education about their problem
- Personalized and individualized care
- Prognosis and plan of care
- Explanation of treatment
- Pain relief and improved function
- Thorough physical examination



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Verbaki J. Sengers M. Remers L. Hawline J. Patient expectations of heatment for book pairs a pytematic mean of qualitation and anothesh studies. *Since* O15 15:00:2502(30):2582318. Patiention J. K. Landon J. M., Landon J. M., Mintlen PE, Laow A, Fernandice-Je-Ja-Pienss C. Devlopment of a disal prediction to be distriputative stim regional back pairs of patient studies. *The Since* O1 a displant K. Nobier, C. Aspinalish even of the data plant and landon galaxies and patients and spina. *The Journal of Ontopaside and sports physical theory* 2012;42(7):877-892. Ministry M. K. Markinski, K. K. Since Markinski, K. Since M. Since M. Since M. Since M. Markinski, J. Since M. M. Adas attending private physichergy practices used diagnosis, pair relef, improved factors declaration and conserva a sume. J. K. Sincehan C. 2012;42(7):829-558.





Remember her?



Pain neuroscience education, also initiated in the first week, included the following key concepts: (1) pain is an output produced by our brain in response to what it perceives as danger; (2) pain is not necessarily associated with tissue damage; (3) a variable relationship exists between nociception and pain; (4) environment can influence perceived pain intensity; (5) persistent pain creates an upregulation in nociception; and (6) the nervous system is plastic and adaptable.²⁷

Sawyer EE, McDevitt AW, Louw A, Puentedura EJ, Mintken PE. Use of Pain Neuroscience Education, Tactle Discrimination, and Graded Motor Imagery in an Individual With Frozen Shoulder. The Journal of orthopsedic and sports physical Henzy, Mar 2014;403(1):174-184.















