

Histopathology of long head of biceps tendon

removed during tenodesis demonstrates degenerative histopathology
and not inflammatory changes

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Disclosures

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Background

- The aim of this study is to describe and quantitatively analyze the histopathology of proximal long head biceps (LHB) tendinopathy in patients who have undergone LHB tenodesis.
- The hypothesis is that severe histopathologic changes of the LHB tendon (LHBT) will most likely be reflected with improved postoperative clinical outcomes.



Methods

- **Inclusion:**

- Pat. with isolated LHB tendinopathy or LHB tendinopathy associated with concomitant shoulder pathologies.
- Failed conservative treatment (12 months)
- Positive pain response (>50% reduction) pre-operatively after LHBT injection with local anesthetic.
- LHBTenodesis procedure between 2008 and 2014.
- Minimum follow-up time was one year

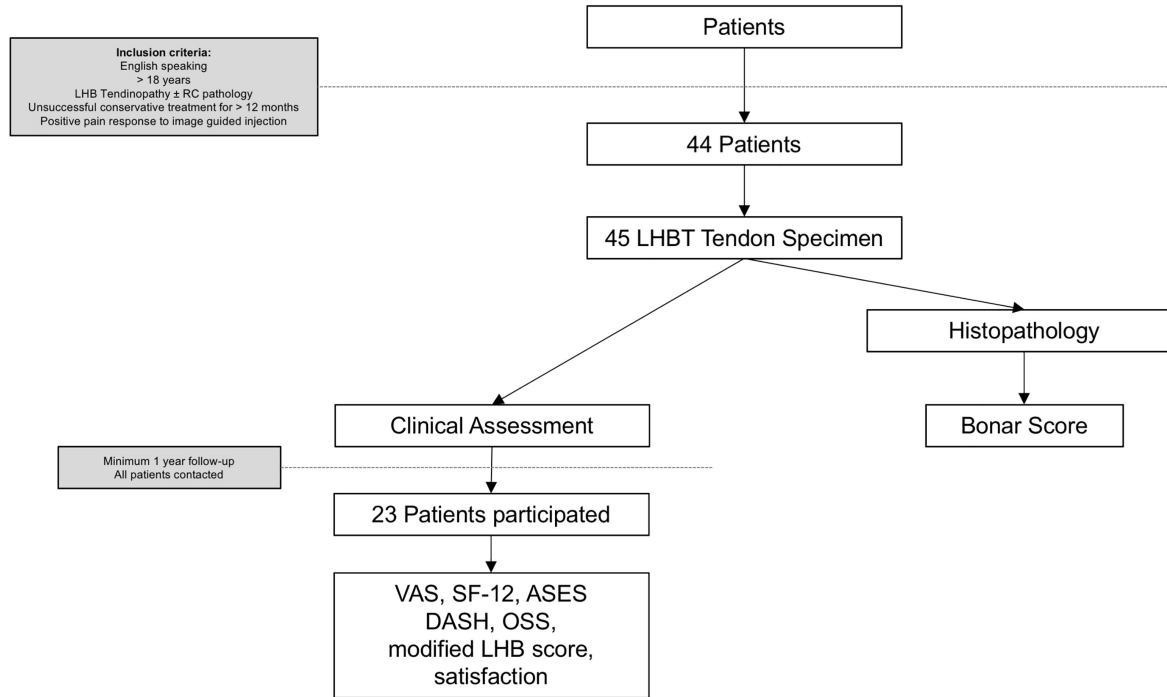


Methods

- **Analyses:**
 - Specimens histologically analyzed with semi-quantitative Bonar scoring system.
 - Subset of patients was retrospectively reviewed postoperatively and evaluated:
 - Visual analogue score (VAS)
 - Short form survey (SF-12)
 - American Shoulder and Elbow Surgeon (ASES) score
 - Disability of Arm, Shoulder and Hand (DASH) score
 - Oxford Shoulder Score (OSS)
 - Postoperative return to work status



Results



Results

	n = 45 [§]	n = 23
Sex		
Female	18 (40%)	12 (52.2%)
Male	27 (60%)	11 (47.8%)
Mean age (± SD, min; max)	48.8 ± 9.9 (30; 70)	50.9 ± 9.6 (32; 70)
Average comorbidities (n = 23)	1.0 ± 1.1 (0; 4)	1.0 ± 1.1 (0; 4)
Handedness		
Right	40 (88.9%)	22 (95.6%)
Left	5 (11.1%)	1 (4.4%)
Surgical side		
Right	26 (57.8%)	14 (61%)
Left	19 (42.2%)	9 (39%)
Employment		
Employed	39 (86.7%)	19 (82.6%)
Unemployed / Retired	6 (13.3%)	4 (17.4%)
Workers' compensation (WC) status		
WC-related	30 (66.7%)	13 (56.5%)
Non-WC-related	15 (33.3%)	10 (43.5%)



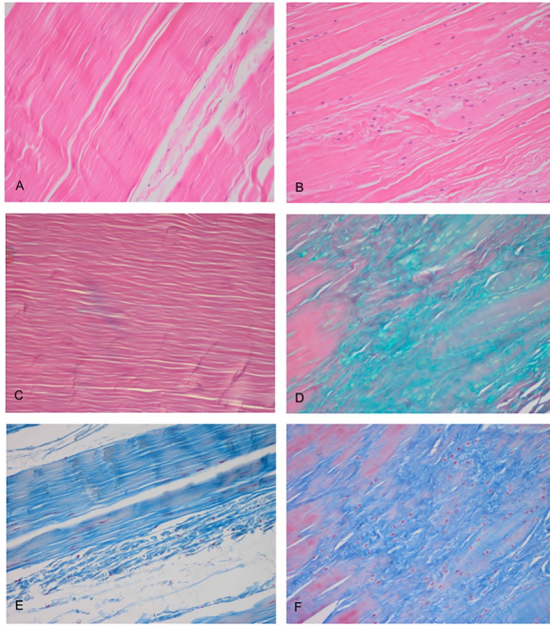
Results

	n = 45§	n = 23
LHBT tenodesis site		
Supra-pectoral	32 (71.1%)	19 (82.6%)
Sub-pectoral	13 (28.9%)	4 (17.4%)
Concomitant surgical procedures#		
Subacromial decompression	25	11
Rotator cuff repair	11	8
Excision of distal clavicle	2	1
Glenohumeral debridement	14	6
Removal of intratendinous calcification (not LHBT)	1	1
Capsular release	3	0
Issues with tenodesis site+	14 (31.1%)	7 (30.4%)
Supra-pectoral	11	5 (61%)
Sub-pectoral	3	2 (39%)
Non-operative Treatment	7 of 14	3 of 7
Pain-medication and physiotherapy only	2	1
Needed Image guided (USS) pain ablation	5	2
Surgical Revision	7 of 14	4 of 7
From proximal to distal supra-pectoral level with anchor fixation	2	2
From supra-pectoral level to sub-pectoral level with anchor fixation	3	1
Staying at sub-pectoral level with anchor fixation	1	0
Staying at sub-pectoral level with all-suture anchor tenodesis	1	1
Return to work (months) (n = 19)	8.5 ± 10.7 (0; 34)	8.5 ± 10.7 (0; 34)
Postoperative Follow-up (months)	21.9 ± 14.2 (12; 55)	34.0 ± 11.1 (12; 55)



multiple concomitant surgical procedures possible per case; + pain, cramping, tendon rupture, fixation failure; LHBT = Long head of biceps tendon USS = ultrasound scan

Results



	Total / All	Low grade BONAR score (≤ 9)	High grade BONAR score (≥ 10)	P-value
Patients (n)	23	14 (60.9%)	9 (39.1%)	
VAS (0-10)	2.2 \pm 2.4 (0; 7)	2.1 \pm 2.2 (0; 7)	2.4 \pm 2.7 (0; 7)	0.536
SF-12 PCS (0-100, 100 best)	45.6 \pm 9.0 (30.9; 56.8)	46.3 \pm 8.4 (30.9; 56.8)	44.6 \pm 10.3 (32.3; 56.8)	0.807
SF-12 MCS (0-100, 100 best)	52.7 \pm 11.5 (24; 66.4)	50.6 \pm 13.0 (24; 61.9)	55.9 \pm 8.5 (41.1; 66.4)	0.234
DASH (0-100, 100 worst)	21.5 \pm 22.0 (0; 85)	23.9 \pm 25.3 (0; 85)	17.6 \pm 16.1 (0; 40)	0.213
OSS (12-60, 60 worst)	29.8 \pm 10.4 (15; 49)	29.2 \pm 10.8 (16; 49)	30.8 \pm 10.3 (15; 48)	0.860
Patients (n)	21	14 (66.7%)	7 (33.3%)	
ASES (0-100, 100 best)	75.9 \pm 21.7 (21.7; 100)	73.6 \pm 22.7 (21.7; 100)	80.6 \pm 20.2 (51.7; 100)	0.229
Patients (n)	17	11 (64.7%)	6 (35.3%)	
LHB Score (0-100, 100 best)	73.7 \pm 16.7 (38; 94)	76.0 \pm 15.9 (40; 94)	69.6 \pm 18.7 (38; 85)	0.712



Bonar score						
	Grading				All specimen (n = 45)	Clinical assessment (n = 23)
	0	1	2	3		
Tenocyte (0-3)	24	19	2		1.5 \pm 0.6 (1; 3)	1.7 \pm 0.6 (1; 3)
Cellularity (0-3)	37	8			1.2 \pm 0.4 (1; 2)	1.2 \pm 0.4 (1; 2)
Vascularity (0-3)	3	10	17	15	2.0 \pm 0.9 (0; 3)	1.9 \pm 0.9 (0; 3)
Ground substance(0-3)	4	22	19		2.3 \pm 0.6 (1; 3)	2.4 \pm 0.6 (1; 3)
Collagen (0-3)	9	22	14		2.1 \pm 0.7 (1; 3)	2.0 \pm 0.7 (1; 3)
Total					9.1 \pm 2.0 (5; 13)	9.1 \pm 2.3 (5; 13)

- Advanced degenerative changes with myxoid degeneration and marked collagen disorganization.
- Clinical outcomes do not correlate significantly with severity of histopathologic changes

Conclusions

- **LHBT histopathology** following tenodesis with prior 12 months failed conservative treatment **demonstrates chronic degenerative changes** with minimal inflammation confirming that the histopathology **resembles a tendinosis** not a tendinitis.
- There is **no regional localization** of histopathological change suggesting **removal of subtotal tendon is recommended** for complete pain elimination.
- Interpretation of postoperative clinical outcomes is **limited** due to a considerable loss of patient follow-up, however, **outcomes appear to be independent of histopathologic changes.**



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