Research paper

Cite as: Rutkauskas S: Aponeurotic expansion of the supraspinatus tendon: sonographic spectrum and proposed classifications. J Ultrason 2026; 26: 3. doi: 10.15557/JoU.2026.0003.

Submitted: 01.11.2025
Accepted: 18.12.2025
Published: 17.03.2026

Aponeurotic expansion of the supraspinatus tendon: sonographic spectrum and proposed classifications

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DOI: 10.15557/JoU.2026.0003

Keywords
biceps brachii; ultrasonography; rotator cuff; tendons/pathology; aponeurotic expansion of the supraspinatus tendon (AEST)

Abstract

Aim: The aponeurotic expansion of the supraspinatus tendon is a recognized but underappreciated anatomical structure of the shoulder. Its sonographic appearance may mimic or coexist with pathology of adjacent tendons, particularly the long head of the biceps tendon, creating diagnostic challenges. Although described in prior literature, many atypical variants remain insufficiently documented. This study aimed to characterize atypical sonographic manifestations of the aponeurotic expansion of the supraspinatus tendon and to propose new classifications based on its relationship with the supraspinatus tendon, its position within the rotator interval, and its association with the long head of the biceps tendon. **Material and methods:** Between October 2018 and September 2025, a total of 3,600 shoulder ultrasound examinations were performed. Nineteen patients (15 women, four men; mean age 60.7 years, range 24–82 years) with pathologically altered aponeurotic expansions were retrospectively identified. Each case was evaluated for structural and positional changes in relation to the supraspinatus, long head of the biceps, and subscapularis tendons. **Results:** The most frequent supraspinatus–aponeurotic expansion relationship was minor intrasubstance tearing (31.6%), followed by complete supraspinatus tears with retraction (21.1%). At the rotator interval, subluxation was observed in 36.8% of cases. Regarding interactions with the long head of the biceps tendon, aponeurotic expansion dislocation with preserved intragroove biceps alignment was most common (31.6%). Several theoretical subtypes were not observed. **Conclusions:** Ultrasound enables detailed assessment of the aponeurotic expansion of the supraspinatus tendon. The proposed classifications provide a structured framework for clinical practice and may guide future research into the diagnostic and functional significance of this complex region.

Introduction

The aponeurotic expansion of the supraspinatus tendon (AEST) is an anatomical structure arising from the anterolateral aspect of the supraspinatus tendon and extending toward the long head of the biceps tendon (LHBT) within the rotator interval (Fig. 1)[1–4]. First described in cadaveric and imaging studies, AEST has been increasingly recognized in modern radiology as a potential source of diagnostic confusion, as it may mimic a bifid biceps tendon, an accessory tendon, or even a partial tear of the LHBT[3,5–9]. With the advent of high-resolution ultrasound and MRI, awareness of AEST has grown; however, its sonographic identification remains challenging and is often overlooked or misinterpreted (Fig. 2)[3,5,10,11].

Only a limited number of classification systems have been proposed for AEST, most of them MRI-based and focused primarily on morphology, thickness, or insertional pattern[1,3,9,12]. Although these frameworks provide a useful anatomical foundation, they fail to encompass the full spectrum of variants and pathological presentations encountered in routine ultrasound examinations. While uncommon, atypical AEST–LHBT configurations may be observed in clinical practice, including subluxations, dislocations, or combined lesions that extend beyond the scope of currently available classifications.

The aim of this study is therefore to present a series of clinical cases illustrating atypical and pathological manifestations of AEST, to highlight their relationship with adjacent structures such as the LHBT and supraspinatus tendon, and to offer a new perspective on this anatomically complex yet highly relevant region of the shoulder.

Material and methods

Subjects

Between October 2018 and September 2025, approximately 3,600 shoulder ultrasound examinations were performed in patients

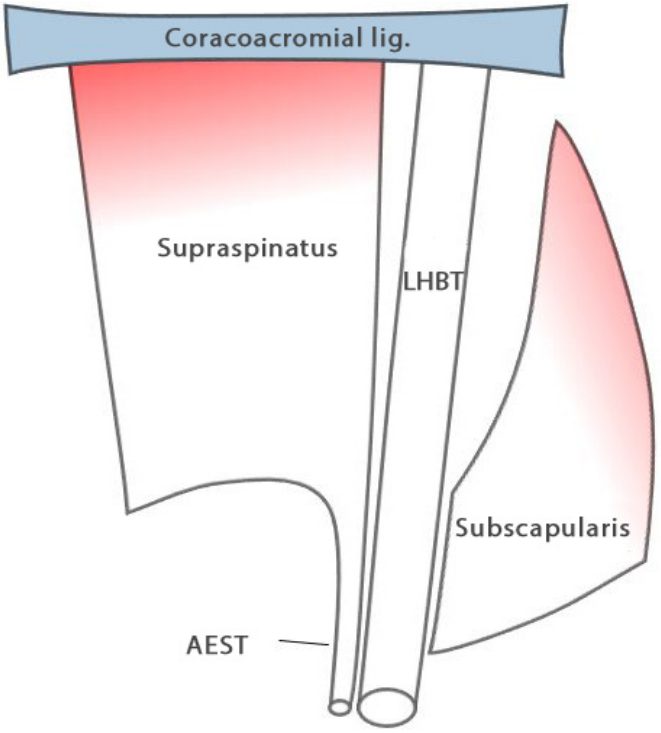

Fig. 1. *Schematic representation of aponeurotic expansion of the supraspinatus tendon (AEST) in relation to the supraspinatus tendon, long head of the biceps tendon (LHBT), and subscapularis tendon; the coracoacromial ligament is indicated as a supraspinatus landmark*

aged 12 to 98 years. During assessment, only structures fulfilling the criteria for AEST were considered, defined as expansions originating from the superomedial border of the supraspinatus tendon, coursing outside the synovial sheath of the LHBT and attaching distally to the pectoralis major tendon. Cases in which AEST was identified in an anterolateral position with typical echogenicity, stable alignment, absence of surrounding fluid, and an intact supraspinatus tendon were considered normal and were excluded from the analysis. Hypoplastic variants in which AEST did not reach the pectoralis major tendon were also excluded. In contrast, all cases showing altered echogenicity or abnormal positioning of AEST, or associated pathology of the supraspinatus, LHBT, or subscapularis tendon, were included in the study. The contralateral shoulder was not evaluated for the presence or absence of AEST. In addition, X-ray and MRI findings were neither available nor collected for this study.

A total of 19 cases with distinct sonographic manifestations of AEST were identified. All patients were referred by various specialists, including family physicians, traumatologists, rheumatologists, and rehabilitation physicians, with suspected shoulder pathology. Demographic data (age and sex) and clinical presentation were analyzed and are summarized in Tab. 1.

This study was based on retrospectively collected ultrasound images obtained during routine clinical practice. All procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki, and strict patient anonymity and confidentiality were maintained throughout the study.

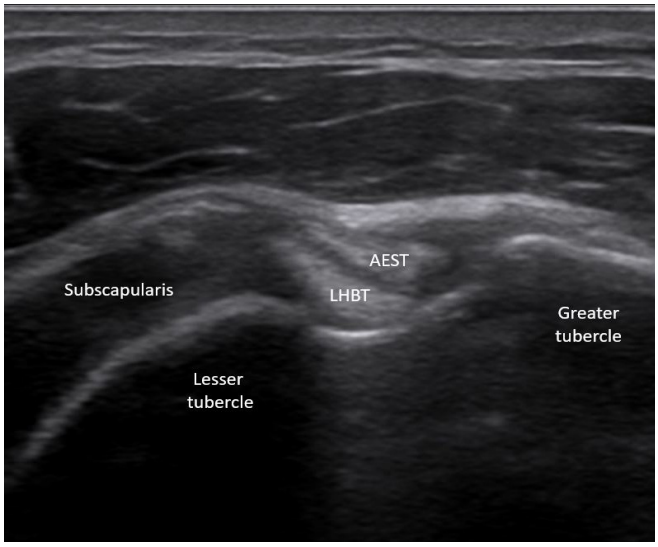

Fig. 2. *Ultrasound image showing normal aponeurotic expansion of supraspinatus tendon (AEST) anterolateral to the long head of the biceps tendon (LHBT) at the intertubercular groove*

Ultrasound examination

Ultrasound examinations were performed using two systems: Mindray M7 (L14–6Ns, 10–12 MHz) and ESAOTE MyLab 9 eXP (L4–15, 4–15 MHz). All scans were conducted by a single radiologist with more than 15 years of musculoskeletal (MSK) experience, performing around 100 examinations per week. When AEST abnormalities were identified, anonymized representative images were stored for subsequent analysis. The protocol followed ESSR recommendations. Patients were examined seated, facing the examiner, with the hand (elbow flexed) placed against the iliac wing to optimize visualization of the supraspinatus tendon and rotator interval. The examiner maintained hand stabilization for reproducibility. This maneuver differs from the Middleton position, in which the hand rests on the posterior hip, which was occasionally applied as an alternative.

At the level of the rotator interval, AEST was assessed for echogenicity, intrasubstance tears, and its relationship to the LHBT and subscapularis tendon (Fig. 3), while the supraspinatus was checked

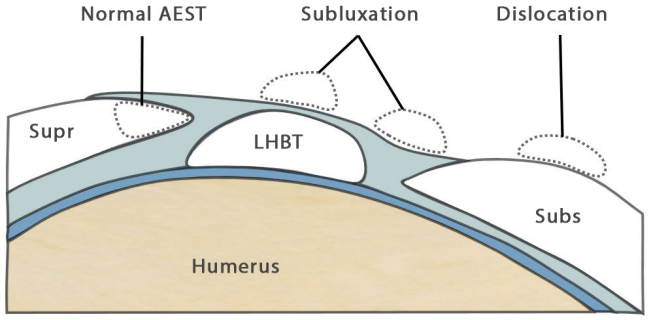

Fig. 3. *Anatomy drawing of aponeurotic expansion of the supraspinatus tendon (AEST) within the rotator interval. Subluxation is defined as displacement above or medial to the long head of the biceps tendon (LHBT); dislocation occurs when positioned over the subscapularis tendon. Supr – supraspinatus; Subs – subscapularis*

Tab. 1. Demographic and clinical characteristics of patients with atypical or pathologically altered aponeurotic expansion of the supraspinatus tendon (AEST), summarized according to the proposed classification systems

Case No.	Age	Gender	Side	Presenting complaints	AEST-supraspinatus relation	AEST at rotator interval	AEST-LHBT relation	Additional findings
1	24	W	Right	Shoulder pain	Ia Mild intrasubstance tear at the basis of AEST	No subluxation	IIIa AEST intragroove position, LHBT dislocation	Unremarkable
2	48	M	Right	Acute trauma	Unremarkable	No subluxation	Ia AEST intragroove subluxation with dislocation below subscapularis, LHBT intragroove position	Complete tear of the pectoralis major tendon with retraction
3	57	M	Left	Shoulder pain	Unremarkable	No subluxation	Ia AEST intragroove subluxation, LHBT intragroove position	Complete tear of the subscapularis tendon
4	78	W	Left	Post-traumatic shoulder pain	IIb Partial tear of the lateral supraspinatus insertion	Subluxation	Ia↔Ib↔Ic AEST dislocation with instability, LHBT intragroove position	Full-width tear of the common supraspinatus and infraspinatus insertion, with preserved medial supraspinatus and lateral infraspinatus portions
5	82	W	Left	Persistent shoulder pain	IIIa Complete tear with retraction of the supraspinatus with severe retraction	Subluxation	IIIc+ AEST dislocation, LHBT dislocation	Severe tendinosis of the long head of the biceps tendon. Moderate tendinosis of the infraspinatus tendon with a partial tear at the cranial margin of the insertion
6	74	M	Left	Shoulder pain	Unremarkable	No subluxation	Ia AEST intragroove subluxation, LHBT intragroove position	Long head of biceps tendon – moderate tendinosis. Rotator cuff – severe diffuse tendinosis with microtears and microcalcifications. Status post greater tuberosity fracture without displacement
7	53	W	Right	Shoulder pain	IIIa Complete tear of the supraspinatus insertion with mild retraction	Subluxation	Ic AEST dislocation, LHBT intragroove position	Long head of biceps tendon – mild tendinosis. Complete tear of the supraspinatus tendon insertion with 2–3 mm retraction
8	65	W	Left	Shoulder pain	Unremarkable	No subluxation	IIIa AEST intragroove position, LHBT dislocation	Mild supraspinatus tendinosis with erosive changes at the insertion
9	52	W	Right	Shoulder pain	Ia Mild intrasubstance tear at the basis of AEST	No subluxation	Unremarkable	Unremarkable
10	62	W	Right	Shoulder pain	IIb Tear of the lateral supraspinatus margin, slightly distal to the insertion	No subluxation	IIIa AEST intragroove position, LHBT dislocation	Severe tendinosis of the long head of the biceps tendon. Severe supraspinatus tendinosis with a full-thickness tear at the lateral margin, ~1 cm from the insertion, with 8 mm retraction
11	70	W	Right	Shoulder pain	IIIa Complete tear with retraction of the supraspinatus with severe retraction	Subluxation	Ia↔ Ib↔Ic↔IIc↔IIIc-↔IIIc+ AEST dislocation with instability, LHBT dislocation with instability	Severe tendinosis of the long head of the biceps tendon. Massive chronic rotator cuff tear (supraspinatus, infraspinatus, and teres minor), with marked retraction. Increased fluid in the glenohumeral joint

Tab. 1. (cont.) Demographic and clinical characteristics of patients with atypical or pathologically altered aponeurotic expansion of the supraspinatus tendon (AEST), summarized according to the proposed classification systems

Case No.	Age	Gender	Side	Presenting complaints	AEST-supraspinatus relation	AEST at rotator interval	AEST-LHBT relation	Additional findings
12	66	M	Right	Shoulder pain	IIIa Complete tear with retraction of the supraspinatus with severe retraction	Subluxation	Ic AEST dislocation, LHBT intragroove position	Moderate tendinosis of the long head of the biceps tendon. Complete supraspinatus tendon tear with retraction. Narrowed bicipital groove. Subscapularis tendon – mildly degenerated echotexture
13	74	W	Right	Shoulder pain	IIb Tear of the lateral supraspinatus margin	No subluxation	IIa AEST intragroove position, LHBT subluxation	Severe tendinosis of the long head of the biceps tendon with subluxation. Full-thickness tear of the lateral supraspinatus (~10 mm wide), without retraction. Moderate subscapularis tendinosis with partial tears at the cranial insertion
14	52	W	Left	Shoulder pain	Ia Mild intrasubstance tear at the basis of AEST	No subluxation	Unremarkable	At the mid-portion of the supraspinatus tendon insertion, the bony contour appears irregular and eroded, with locally pronounced tendon calcification
15	77	W	Right	Shoulder pain	Ia Mild intrasubstance tear at the basis of AEST	No subluxation	IIb AEST subluxation, LHBT subluxation	Moderate tendinosis of the long head of the biceps tendon at the rotator interval segment with microtears. Moderate supraspinatus tendinosis with marked degenerative changes
16	53	W	Right	Shoulder pain	IIb and Ia Narrow full-thickness supraspinatus tear in the lateral region, distal to the insertion and intrasubstance tear of AEST with ganglion formation	No subluxation	Unremarkable	Supraspinatus – markedly degenerated echotexture. At the lateral region, ~1.2 cm from the insertion, a 4 mm full-thickness tear with fatty infiltration is observed
17	54	W	Left	Shoulder pain	Ic Moderate intrasubstance tear	Subluxation	Ic AEST dislocation, LHBT intragroove position	Mild supraspinatus tendinosis
18	54	W	Right	Shoulder pain	Ib Severe intrasubstance tear	Subluxation	Ic AEST dislocation, LHBT intragroove position	Mild supraspinatus tendinosis
19	58	W	Left	Shoulder pain	Ia Intrasubstance tear of AEST with ganglion formation	No subluxation	Unremarkable	Moderate supraspinatus tendinosis

for tear-related changes. AEST was then examined at the intertubercular groove to determine its position (intragroove, subluxation, dislocation, medial dislocation; Fig. 4), along with LHBT and subscapularis integrity. The remaining shoulder structures, including the other rotator cuff tendons and the glenohumeral and acromioclavicular joints, were systematically reviewed. The findings are summarized in Tab. 1.

All ultrasound images were additionally reviewed by a second MSK ultrasound specialist with 17 years of scanning experience, who was blinded to the initial interpretations.

Results

Among the 3,600 shoulder ultrasound examinations, 23 cases were initially suspected of AEST pathology. After detailed review, four cases were excluded: one due to a thin hyperechoic fibrous band within a degenerative LHBT mimicking a bifid tendon (Fig. 5), two cases in which normally echogenic fibers were preserved despite advanced LHBT degeneration (Fig. 6), and one case of hypoplastic LHBT (Fig. 7).

Nineteen cases of AEST pathology were identified (0.53%), with a mean patient age of 60.7 years. The cohort included 15 women and

four men; 58% of cases were right-sided, 42% left-sided, with one bilateral case (17, 18). No true bifid LHBT was found. Interobserver analysis demonstrated agreement in 17 of 19 cases (89.5%); the second reviewer was uncertain in cases 4 and 11, resulting in a Cohen's kappa value of 0.80, indicating substantial reliability. Demographic and clinical details are summarized in Tab. 1.

AEST and supraspinatus relationship

A classification of the supraspinatus–AEST relationship was proposed, ranging from minor intrasubstance lesions to complete ruptures (Fig. 8). Sonographic assessment was based on evaluation of the full supraspinatus tendon (100%), using the greater tuberosity and coracoacromial ligament as landmarks, and tear extent calculated by a standardized technique.

The most frequent subtype was Ia (6/19, 31.6%), with mild intrasubstance AEST tears (Fig. 9), occasionally with ganglion formation (Fig. 10). Subtype IIIa (4/19, 21.1%) involved complete supraspinatus tendon tears with retraction. Subtype IIb (3/19, 15.8%) included one mixed IIb+Ia case with a lateral tear plus intrasubstance lesion.

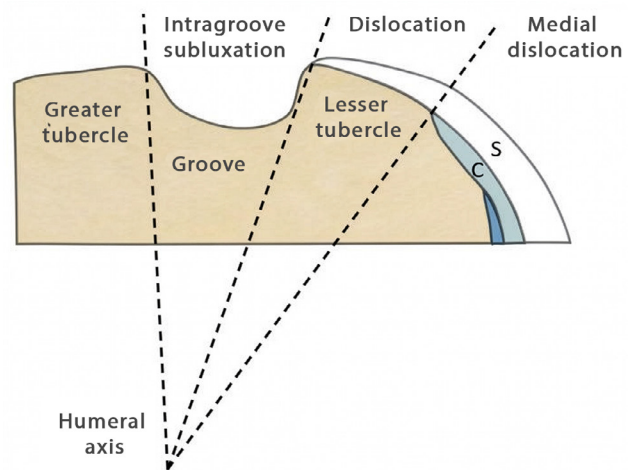

Fig. 4. *Evaluation of aponeurotic expansion of the supraspinatus tendon (AEST) at the intertubercular groove: normally lateral to the long head of the biceps tendon (LHBT); in intragroove subluxation, over or medial to LHBT; in subluxation, on the edge of the lesser tubercle; in dislocation, on the facet of the lesser tubercle at the subscapularis insertion (S); and in medial dislocation within the glenohumeral joint capsule (C)*

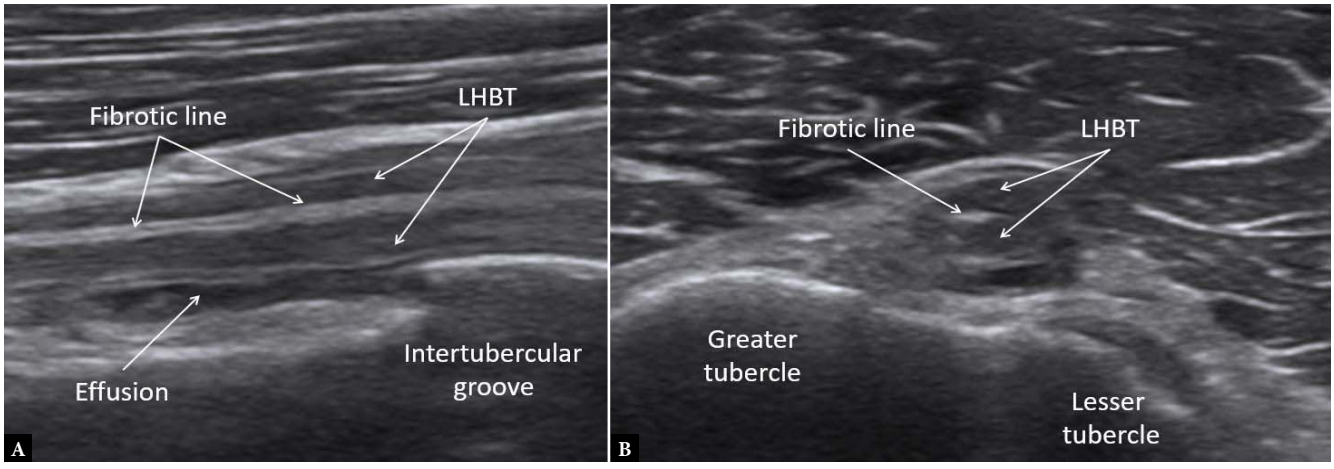

Fig. 5. *Pseudo-double long head of the biceps tendon (LHBT).* **A.** *Longitudinal view mimicking a bifid tendon.* **B.** *Transverse view showing a narrow intratendinous fibrous band accentuated by degenerative changes*

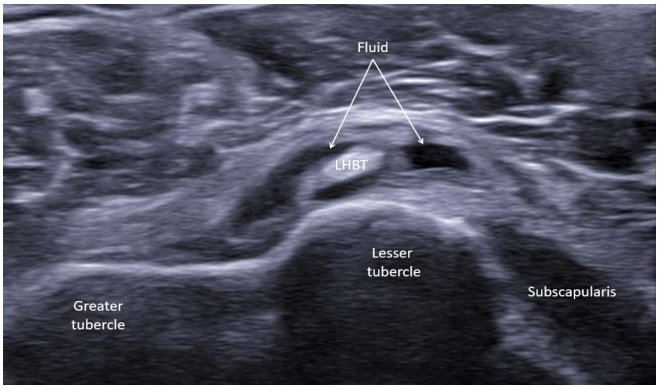

Fig. 6. *Residual echogenic fibers within the long head of the biceps tendon (LHBT) with surrounding fluid and degenerative changes*

Fig. 7. *Long head of the biceps tendon (LHBT) hypoplasia in the left shoulder of a 28-year-old female; absent on the contralateral side*

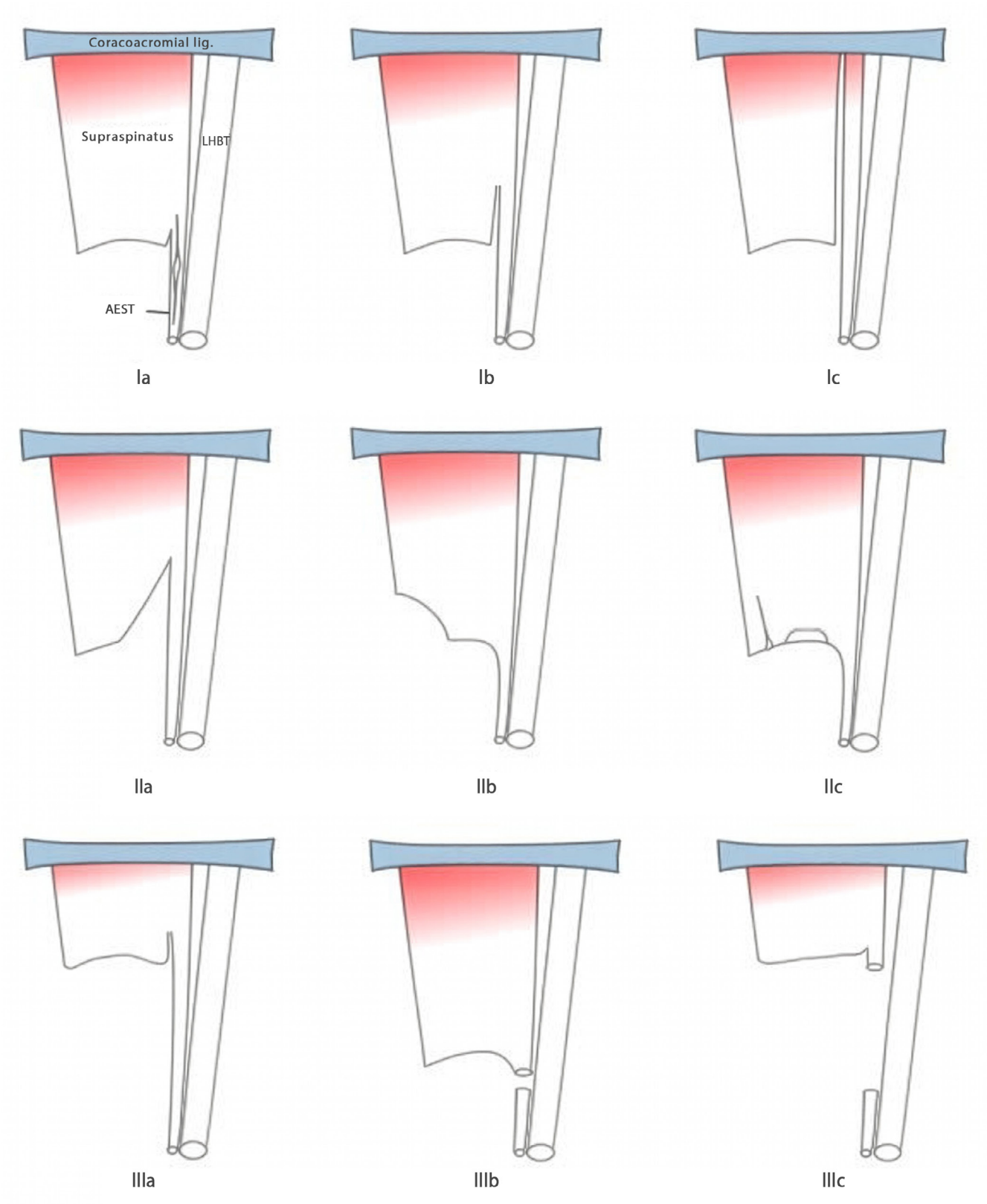

Fig. 8. *Proposed classification of the supraspinatus–AEST relationship. Type I: intrasubstance AEST tears (Ia <20%, Ib <50%, Ic >50%). Type II: partial supraspinatus tears (IIa medial full-thickness, IIb lateral full-thickness, IIc PASTA/rePASTA or intrasubstance). Type III: complete tears (IIIa supraspinatus, IIIb AEST, IIIc both). AEST – aponeurotic expansion of the supraspinatus tendon; LHBT – long head of the biceps tendon*

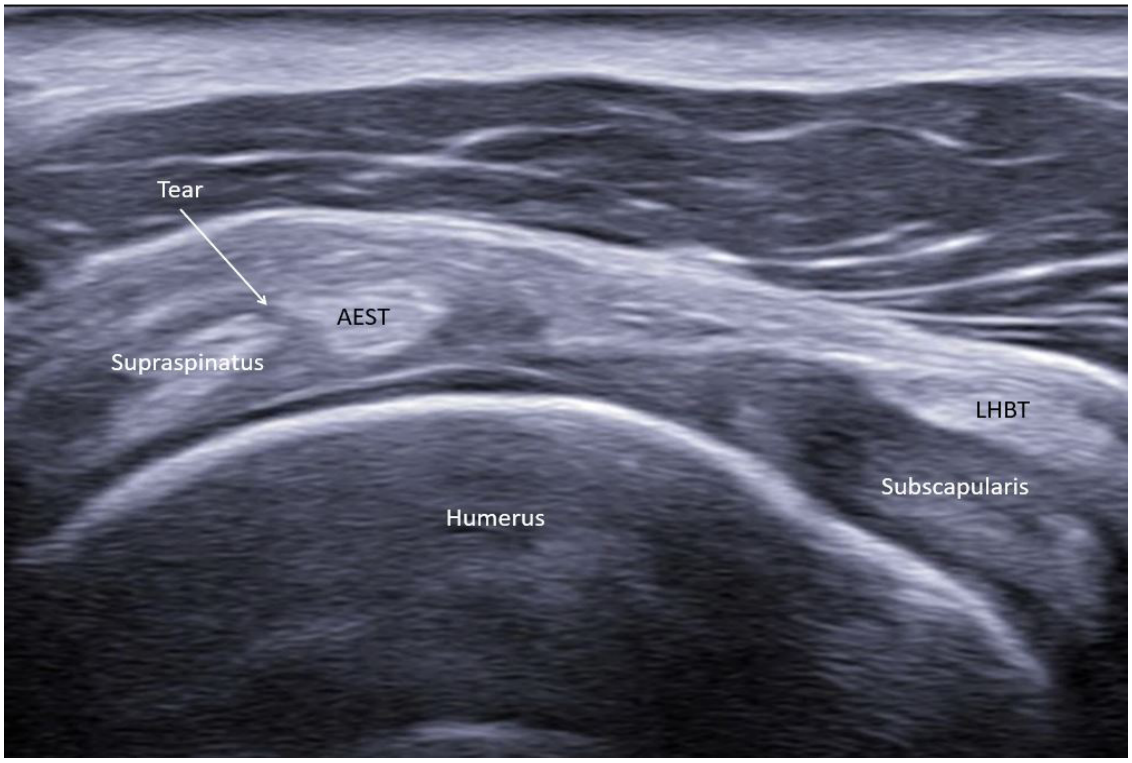

Fig. 9. *Mild intrasubstance tear of aponeurotic expansion of the supraspinatus tendon (AEST) at the base of the supraspinatus tendon in the right shoulder (AEST–supraspinatus classification: Ia, case 1)*

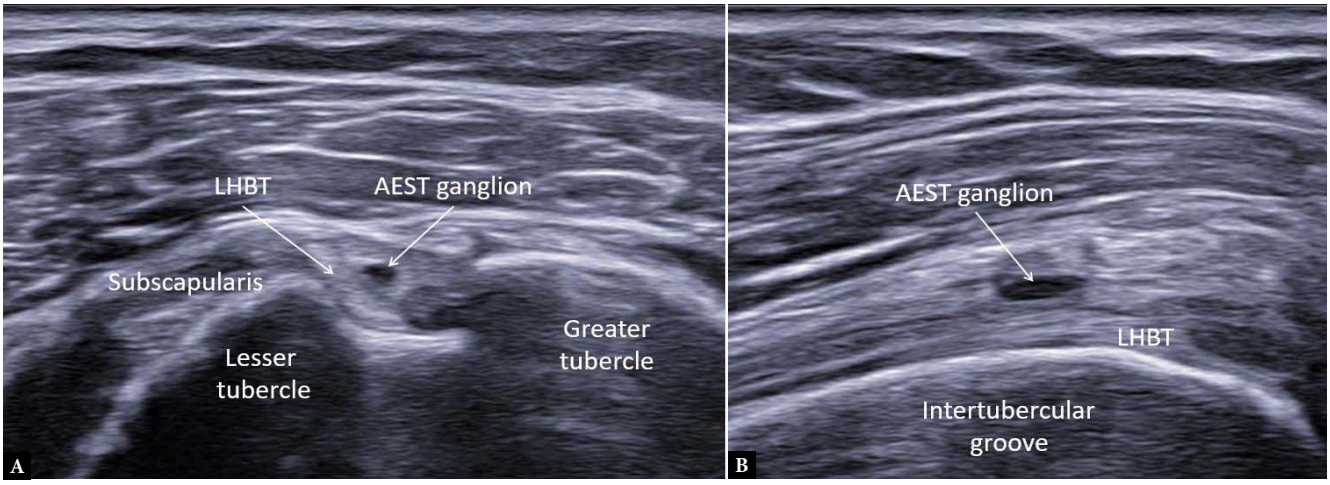

Fig. 10. *Small intra-aponeurotic ganglion in the left shoulder.* **A.** *Transverse view of aponeurotic expansion of the supraspinatus tendon (AEST).* **B.** *Longitudinal view (AEST–supraspinatus classification: Ia, case 19)*

Less common subtypes included Ib (1/19, 5.3%) and Ic (1/19, 5.3%). In three cases (15.8%), no supraspinatus abnormalities were found. Subtypes IIa, IIc, IIIb, and IIIc were not observed.

AEST position in the rotator interval

A second proposed classification was developed to describe AEST positioning within the rotator interval (Fig. 3 and Fig. 11). Importantly, the relationship of AEST at the intertubercular groove level depends on the degree of its detachment from the supraspinatus tendon and whether subluxation or dislocation is present (see AEST and LHBT relationship).

Subluxation of AEST was identified in seven cases (36.8%) (Fig. 12 and Fig. 13). In two patients (cases 5 and 11), both the LHBT and AEST were dislocated over the lesser tubercle; in these situations, AEST at the rotator interval level was also classified as subluxated, as it extended beyond the anatomical boundaries of the interval. No cases of AEST dislocation within the rotator interval were observed.

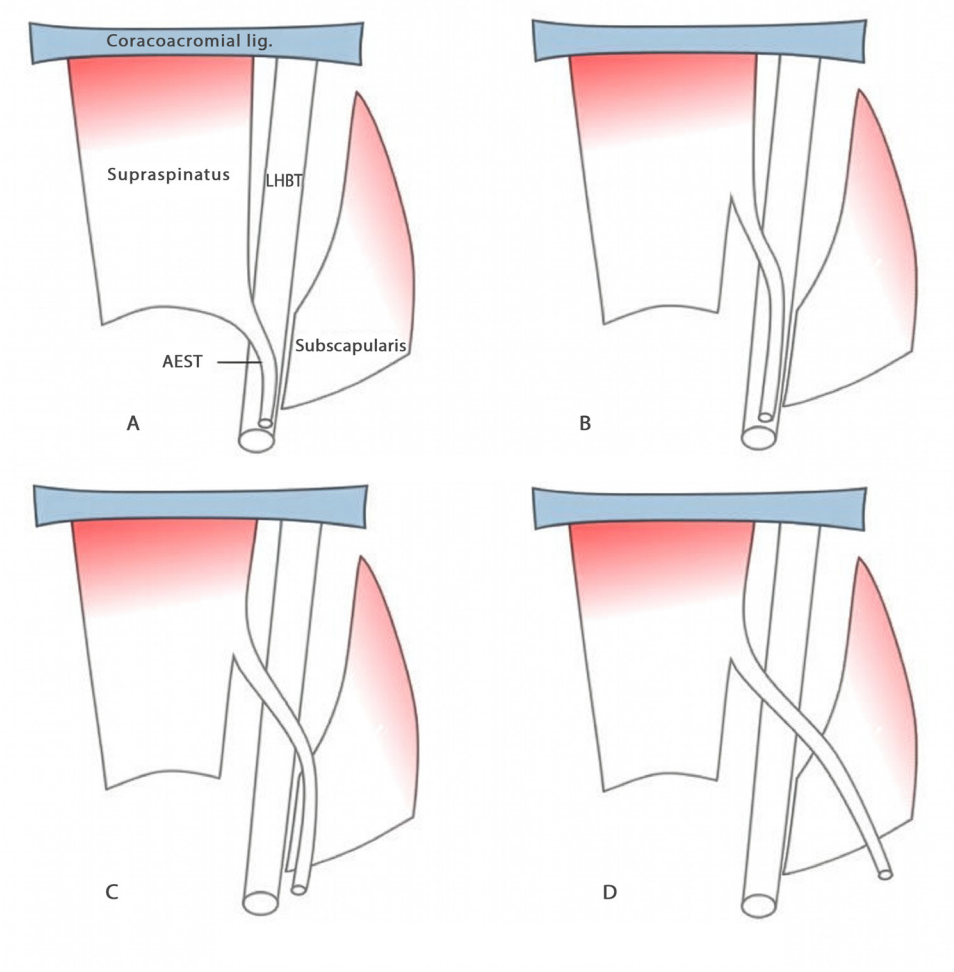

Fig. 11. *Variants of aponeurotic expansion of the supraspinatus tendon (AEST) subluxation in the rotator interval:* **A.** *intragroove subluxation,* **B.** *intrainterval and intragroove subluxation,* **C.** *intrainterval subluxation with intragroove dislocation,* **D.** *intrainterval subluxation with intragroove medial dislocation*

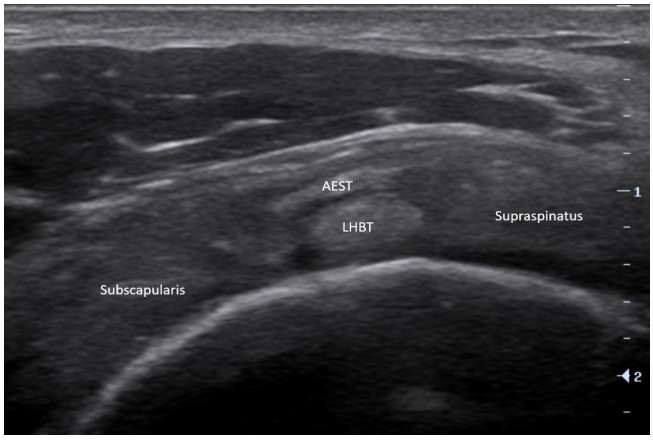

Fig. 12. *Aponeurotic expansion of the supraspinatus tendon (AEST) subluxation over the long head of the biceps tendon (LHBT) at the midline of the rotator interval in the left shoulder (case 17)*

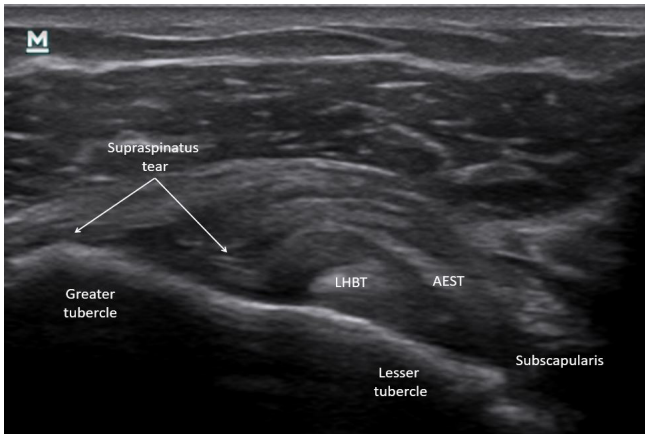

Fig. 13. *Aponeurotic expansion of the supraspinatus tendon (AEST) subluxation medial to the long head of the biceps tendon (LHBT) with a full-thickness supraspinatus tear in the right shoulder (case 7)*

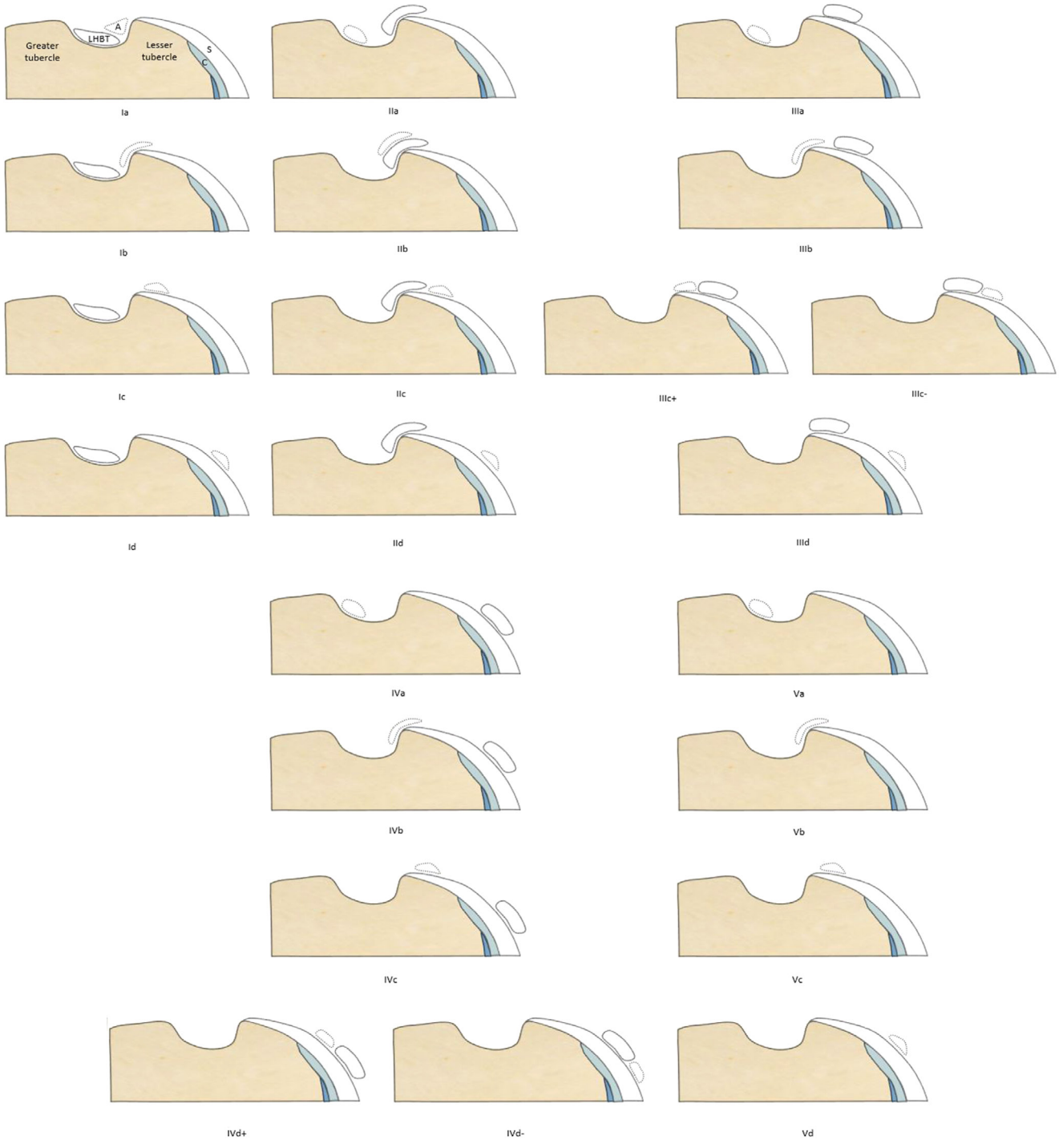

Fig. 14. *Proposed classification of the AEST–LHBT relationship at the intertubercular groove. Five major types are defined by LHBT position: Type I – intragroove LHBT (Ia intragroove subluxation, Ib subluxation, Ic dislocation, Id medial dislocation); Type II – LHBT subluxation (IIa intragroove AEST, IIb both subluxated, IIc AEST dislocation, IId AEST medial dislocation); Type III – LHBT dislocation (IIIa intragroove AEST, IIIb AEST subluxation, IIIc+ both dislocated, IIIc– reciprocal dislocation, IIId AEST medial dislocation); Type IV – LHBT medial dislocation (IVa isolated, IVb AEST subluxation, IVc AEST dislocation, IVd+ AEST medial dislocation, IVd– reciprocal medial dislocation); Type V – LHBT tear (Va intragroove AEST, Vb subluxation, Vc dislocation, Vd medial dislocation). A – AEST; S – subscapularis; C – capsule. AEST – aponeurotic expansion of the supraspinatus tendon; LHBT – long head of the biceps tendon*

AEST and LHBT relationship

A third proposed classification addressed the relationship between AEST and the LHBT, using the LHBT as the reference structure. Five main types were distinguished according to LHBT status: intragroove, subluxated, dislocated, medially dislocated, or ruptured. The detailed classification is presented in Fig. 14.

The most frequent abnormality was AEST dislocation with preserved intragroove LHBT, observed in six of 19 cases (31.6%) (Fig. 15). LHBT dislocation in the presence of intragroove AEST was identified in three cases (15.8%) (Fig. 16), while AEST intragroove subluxation with preserved LHBT alignment was found in another three cases (15.8%) (Fig. 17). Combined pathology included two cases (10.5%) of concomitant AEST and LHBT dislocation (Fig. 18), one case (5.3%) of LHBT subluxation with intragroove AEST, and one case (5.3%) of concomitant AEST and LHBT subluxation (Fig. 19). In four cases (21.1%), no abnormalities were observed.

Twelve subtypes (63.2%) of the AEST–LHBT classification were not observed. In two cases (10.5%), instability led to shifting positions and varying subtypes. One acute trauma case (case 2) showed normal AEST in the rotator interval, subluxation at the intertubercular groove, and a medial course to the retracted pectoralis major tendon (Fig. 20).

Other findings

Supraspinatus abnormalities were the most frequent (13/19, 68.4%), including tendinosis, full-thickness tears (with or without retraction), one massive chronic tear, and two cases with severe degeneration or calcification. The subscapularis tendon was affected in 3/19 cases (15.8%): one complete tear, one moderate tendinosis with a partial tear, and one mild degeneration.

Discussion

The classifications proposed in this study provide a preliminary framework for systematizing the sonographic appearance of AEST and its relationship with the supraspinatus tendon and LHBT. Previous research has already highlighted that AEST may contribute to shoulder pathology and is frequently underrecognized during routine imaging[2,3,9,11]. However, almost all available studies to date have been based on magnetic resonance imaging, and dedicated ultrasound investigations of AEST are lacking.

Unlike the classification proposed by Moser et al.[1], which categorizes AEST according to morphological shape, such an approach is challenging to apply in daily practice because AEST may vary in

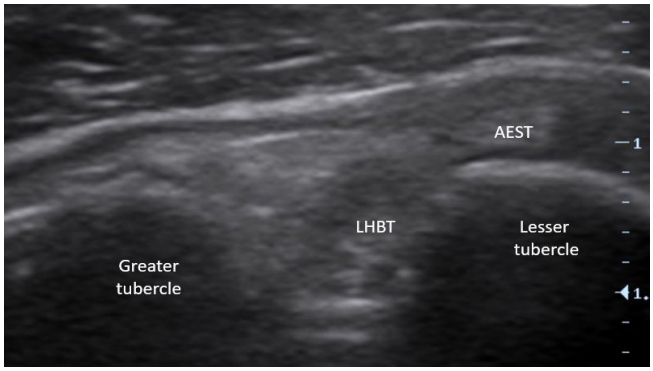

Fig. 15. *Aponeurotic expansion of the supraspinatus tendon (AEST) dislocation with preserved intragroove long head of the biceps tendon (LHBT) in the right shoulder (AEST–LHBT classification: Ic, case 12)*

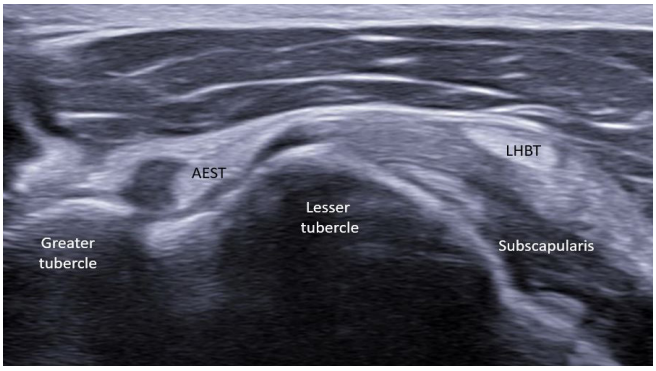

Fig. 16. *Intragroove aponeurotic expansion of the supraspinatus tendon (AEST) with long head of the biceps tendon (LHBT) dislocation in the right shoulder (AEST–LHBT classification: IIIa, case 1)*

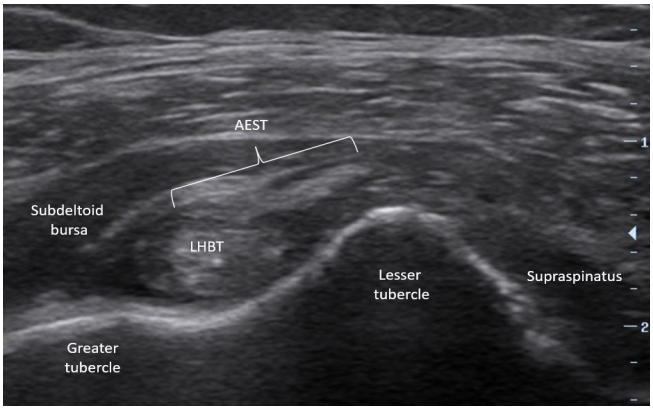

Fig. 17. *Aponeurotic expansion of the supraspinatus tendon (AEST) intragroove subluxation with preserved long head of the biceps tendon (LHBT) alignment in the right shoulder (AEST–LHBT classification: Ia, case 11)*

Fig. 18. *Combined aponeurotic expansion of the supraspinatus tendon (AEST) and long head of the biceps tendon (LHBT) dislocation in the left shoulder (AEST–LHBT classification: IIIc+, case 5)*

Fig. 19. *Concomitant aponeurotic expansion of the supraspinatus tendon (AEST) and long head of the biceps tendon (LHBT) subluxation in the right shoulder (AEST–LHBT classification: IIb, case 15)*

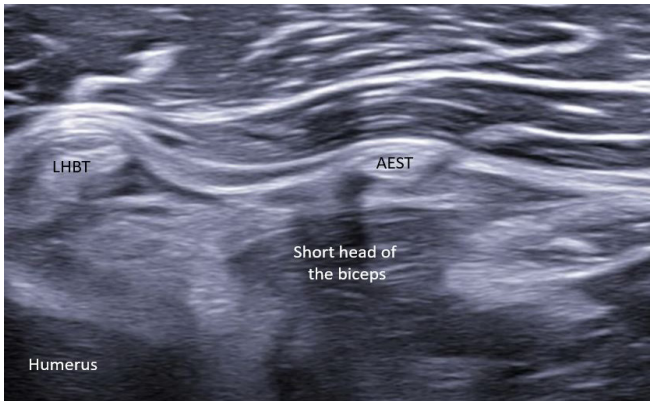

Fig. 20. *Medial course of aponeurotic expansion of the supraspinatus tendon (AEST) over the short head of biceps toward the retracted pectoralis major stump (not shown), with preserved long head of the biceps tendon (LHBT) alignment in the right shoulder (AEST–LHBT classification: Ia, case 2)*

form along its course. Moreover, nearly all MRI-based studies to date have focused on unaltered anterolateral variants of AEST, emphasizing morphology, course, and insertion[1–3,9,11].

Jo et al. found a significant association between the presence of AEST and supraspinatus tendon tears, although no evidence of tears within AEST itself was provided[10]. Uludağ et al. reported a case of massive rotator cuff rupture with preserved AEST and concomitant LHBT instability, which in our proposed system would correspond to a Type IIIa pattern[12]. To date, only one MRI-based report has described split tears of AEST[3], underscoring the scarcity of evidence for true AEST pathology compared with the present sonographic findings.

AEST instability is clinically important, as dynamic sonography shows positional shifts, sometimes accompanying LHBT dislocation[3–5,7]. This highlights the value of repeated ultrasound examinations with provocative maneuvers. The mechanism of intrainterval subluxation or intragroove dislocation appears to be multifactorial: cuff tears may reduce stabilizing tension, while preserved AEST in some subscapularis ruptures suggests a stabilizing role. These observations are consistent with MRI/MRA studies reporting AEST involvement in complex rotator cuff and pulley lesions[1,3,4,10]. Although some theoretical scenarios, such as combined LHBT rupture with AEST displacement, were not observed in this cohort, they remain supported by known LHBT pathologies[3,4,7,9].

The main limitation of this study is the small number of identified AEST abnormalities, which restricts the strength and generalizability of the conclusions. To confirm and refine the proposed classifications and to better understand the anatomical and pathological spectrum of AEST variants, more comprehensive future studies are warranted. Such studies should incorporate systematic bilateral shoulder evaluation, clinical examination findings, X-ray and MRI correlation, arthroscopic confirmation where available, and relevant comorbidities. A broader multimodality approach may help clarify the relationship between AEST and the supraspinatus tendon, improve diagnostic accuracy, and support surgical decision-making.

Conclusions

Ultrasound can reliably detect AEST pathology and provides dynamic, high-resolution assessment. The proposed classification, based on AEST position and its relationship with the supraspinatus tendon and the long head of the biceps tendon, offers a practical framework for clinical use. Although preliminary, this system highlights the diagnostic relevance of AEST and may help prevent misinterpretation in daily practice. Future multicenter studies integrating ultrasound and MRI are essential to validate and refine this classification and to better understand the role of AEST in shoulder pathology.

Conflict of interest

The author does not report any financial or personal connections with other persons or organizations which might negatively affect the contents of this publication and/or claim authorship rights to this publication.

Acknowledgements

The author acknowledges the use of AI-based language assistance (ChatGPT, OpenAI, version GPT-5) for English language editing and text refinement. No external support or funding was received for this study. The author also thanks MD Darius Dicevicius (pain specialist, Siauliai, Lithuania) for independently reviewing all ultrasound cases and contributing to the interobserver assessment.

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