

1 [High degree of consensus achieved regarding diagnosis and treatment of ACJ instability among European](#)
2 [Shoulder Surgeons](#)

3 ~~Diagnosis and treatment of acromioclavicular joint dislocation. Consensus paper 2020~~

4
5 **ABSTRACT**

6
7 **Purpose:** To develop a consensus on diagnosis and treatment of acromioclavicular joint instability.

8 **Methods:** A consensus process following the modified Delphi technique was conducted. Panel members were selected
9 among the European Shoulder Associates of ESSKA. Five rounds were performed between October 2018 and
10 November 2019. The first round consisted of gathering questions which were then divided into blocks referring to
11 imaging, classifications, surgical approach for acute and chronic cases, conservative treatment. Subsequent rounds
12 consisted of condensation by means of an online questionnaire. Consensus was achieved when $\geq 66.7\%$ of the
13 participants agreed on one answer. Descriptive statistic was used to summarize the data.

14 **Results:** A consensus was reached on the following topics. Imaging: a true anteroposterior or a bilateral Zanca view
15 are sufficient for diagnosis. 93% of the panel agreed on clinical override testing during body cross test to identify
16 horizontal instability. The Rockwood classification, as modified by the ISAKOS statement, was deemed valid. The
17 separation line between acute and chronic cases was set at 3 weeks. The panel agreed on arthroscopically assisted
18 anatomic reconstruction using a suspensory device (86.2%), with no need of a biological augmentation (82.8%) in acute
19 injuries, whereas biological reconstruction of coracoclavicular and acromioclavicular ligaments with tendon graft was
20 suggested in chronic cases. Conservative approach and postoperative care were found similar

21 **Conclusion:** A consensus was found on main topics of controversy in the management of acromioclavicular joint
22 dislocation. Each step of the diagnostic treatment algorithm was fully investigated and clarified.

23 [Level of Evidence: V.](#)

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ha formattato: Inglese (Stati Uniti)

28 **INTRODUCTION**

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30 Injuries of the acromioclavicular (AC) joint are quite common, accounting for 3–12% of all shoulder injuries [7]. The
31 incidence even rises up to 40-50% when it comes to contact sports [12], with the highest prevalence in men in their
32 second or third decade of life [5]. It seems evident that diagnosis and management of acute and chronic AC joint
33 dislocations need to be well stated. However, although a [plethora](#) literature is available, a clear consensus has still
34 not been achieved.

35 Traditionally, AC joint dislocations has been diagnosed on [radiographs](#), through bilateral standard anteroposterior
36 (AP) and Zanca views, and then classified according to the Rockwood classification. Conservative management is
37 usually preferred in low-grade injuries (Rockwood type I and II), whereas symptomatic high-grade injuries (types IV-
38 VI) are routinely managed surgically. Management of acute type III injuries is still an ongoing subject of controversy
39 [16]. Decision making is often based on patient's work and sporting activity as well as surgeon's personal opinion and
40 experience. However, concerns have been raised on each step of the decision-making process. Even when it comes to
41 conservative management, best type and length of immobilization have not been defined yet [21]. Regarding surgical
42 therapy, the wide range of available new surgical procedures clearly reflects the lacking of a golden standard; each
43 technique is associated with limitations and, finally, none of them have been demonstrated to be superior to the others
44 with respect to clinical outcomes [4].

45 Therefore, the European Shoulder Associates (ESA), section of the European Society of Sports Traumatology, Knee
46 Surgery and Arthroscopy (ESSKA), aimed to develop a consensus on the evaluation and management of AC joint
47 dislocation in order to provide a unified expert opinion on this topic. [We hypothesized that there would be a high degree
48 of consensus in the diagnosis and the treatment of AC joint dislocations despite the plethora of literature on diagnostic
49 tools and treatment options.](#)

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54 **MATERIALS AND METHODS**

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56 A consensus process with an international panel of experienced clinicians using the modified Delphi technique was
57 implemented [11].

58 The Delphi procedure is a systematic instrument, which aims to measure and develop consensus when empirical
59 evidence is lacking. The ESSKA- ESA followed the steps of this procedure in order to guarantee the quality of its work.

60 The process consisted of two consecutive phases: systematic literature reviews and consensus development.

61

62 *Systematic review*

63 The systematic literature reviews of imaging and treatment were published in 2018 [15]. These publications were made
64 available for the questions of the Delphi consensus.

65 The results of the literature search were then allocated according to the three following items: imaging; classification;
66 and treatment. All search results not allocated to the above were not considered for further evaluation.

67 *Consensus development*

68 According to Hsu et al.[11], the Delphi consensus was developed. Criteria for [not further asking a question in](#)
69 [the next round](#) were: a) $\geq 66.7\%$ of the participants agreed on one answer; b) The percentage of the answer
70 was steady between two rounds; c) If no consensus was found in round 5, this question was marked as having “no
71 consensus” for any of the answers.

72 In total, 5 rounds were performed within 18 months of the Delphi process (systematic reviews in May 2018, round 1 in
73 October 2018, round 5 in November 2019). Round 1 consisted of a panel meeting at the ESA closed meeting in Athens,
74 October 2018. Rounds 2 to 4 were based on online questionnaires. Round 5 was a panel meeting at ESSKA Specialty
75 Days, Madrid, November 2019.

76 If an answer had not reached consensus within one round, the panel was informed about the percentage on respondent
77 voting for the according answer. Suggestions for new answers were implemented in the next round in rounds 2 to 4.

78 Each round was prepared by the main and senior authors, who remained blinded to respondent identities when
79 reviewing responses.

80

81 *Nomination and selection of panel members*

82 Panel members were selected among the members of ESA for rounds 2 to 4. For round 1 and 5 the panel was made up
83 by the auditorium willing to participate. For round 5, two participants were chosen to be vote counters. Respondents to
84 either of rounds 2 to 4 were considered panel members and were invited to participate in the final, fifth Delphi round.

85

86 *Round 1: Development of initial questions and answers (Q&A)*

87 After systematically reviewing the current literature and evidence, important questions and possible answers regarding
88 the diagnosis and treatment of ACJ separation were gathered in an open panel meeting in round one. ■ and ■ lead
89 the panel meeting and collected the Q&A. The panel was confronted with the current evidence. If an answer was
90 [supported by current literature](#), it was noted for round two.

91 *Round 2: Gathering additional Q&A*

92 *Round 2: Gathering additional Q&A*

93 The Q&A of round one was entered into an electronic data-capture system (Google Forms, Google Inc., Alphabet Inc.,
94 Mountain View, CA, USA). The panel was able to review the current literature on each question and have an informed
95 answer on all the questions. Answers for open questions were noted to round three.

96

97 *Rounds 3 and 4: Condensing*

98 Answers from round 2 were assessed by the core panel (CR, KB, FM, GM) for the above-mentioned criteria (agreement
99 $\geq 66.7\%$ [\(consensus level\)](#) steady percentage between two rounds). If an answer reached the consensus level, it was
100 not asked again in the following round.

101

102 *Round 5*

103 The answers that either did not reach consensus level or unclear questions were discussed in an open panel meeting. If a
104 consensus was found, it was noted accordingly.

105

106 *Statistical analysis*

107 Survey data were transferred to SPSS Statistics 25 software (IBM Corp., Armonk, NY, USA) for standard descriptive
108 analyses. Consensus was achieved for a categorical response when it involved at least two-thirds of respondents. Final
109 adjudication after the fifth survey was made by the authors for a few questions that did not lead to clear consensus.

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111

112 **RESULTS**

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114 From this first round, members were asked to participate in the consensus process. In the second round, [28 out of 49](#)
115 [\(57%\)](#) responded, in the third round [29 \(59%\)](#), and [30 \(61%\)](#) in the fourth round. At the final

116 round, which was again not online, 40 panel members were available for voting. Before opening the consensus questions,
117 the panel was asked about their frequency of annual AC-joint surgeries. About 54% treated between 10-50 AC joints,
118 whereas the other 46% treated less than 10 AC joints per year (**Table 1**).

119 Questions were divided into 5 blocks referring to the radiographic modalities to diagnose AC joint pathologies, the
120 classification systems to grade differences, the surgical approach for acute and chronic cases as well as the postoperative
121 treatment.

122

123 *Radiographic evaluation*

124 After the final round the panel reached a consensus regarding the radiological approach to diagnose and classify AC joint
125 dislocations. The consented radiographs are a true a.p. radiograph, as well as a panoramic view (bilateral Zanca
126 radiographs) without loading of the arm. To address the horizontal instability through radiographs no consensus was
127 reached. However, clinical override testing during body cross test was proposed by 93% of the panel members to identify
128 horizontal instability. In addition, a consensus was reached after the third round (79.3%), that no additional imaging is
129 needed for the assessment of AC joint instability (e.g. computed tomography, magnetic resonance or ultrasound, **Figure**
130 **1**).

131

132 *Classification*

133 After round three there was a clear consensus regarding different classifications. The Tossy classification[23] and the
134 Bannister classification [1] are not recommended to classify the type of AC dislocation (93.1% respectively 93,10% voted
135 against using this classification). So far, the Rockwood classification is still the most valid classification. The ISAKOS
136 statement (concerning grade III) was consented to be sufficient for a comprehensive classification (**Figure 2**).

137

138 *Acute injury*

139 After round four an acute case was defined as an AC joint dislocation presenting within the first 3 weeks after trauma.
140 Regarding the surgical treatment, an arthroscopically assisted anatomic reconstruction using a suspensory device
141 (synthetic augmentation) is recommended (86.2%), with no need of an additionally biological augmentation (82.8%)
142 (**Figure 3**).

143

144 *Chronic injury*

145 As following the definition of acute cases, the panel defined a chronic case if the initial trauma occurred more than 3
146 weeks ago. There was an early (after round 3) consensus regarding the usage of biological augmentation in chronic cases,

147 with the need to address the AC capsule. Therefore, a tendon augmentation is recommended, wrapping the tendon around
148 the coracoid. Additionally, there is no recommendation for a distal clavicle resection in chronic cases (95%) and the panel
149 denied using this surgical approach (**Figure 4**).

150

151 *Treatment*

152 Postoperative treatment modalities differed depending on acute or chronic cases. The results showed no different
153 treatment strategy of conservative or postoperative treatment, in regard to “back-to-sports”, weight restrictions or active
154 and passive mobilization. A shoulder sling is recommended for immobilization for 3 weeks after surgery. A high
155 consensus was reached (100%) with a limitation of range of motion with no activities of daily living for the first 6 weeks
156 and a free range of motion 6 weeks after surgery (100%) (**Figure 5**).

157 The mode to change from conservative to surgical treatment is defined by the patients’ persistence of pain (93.3%).

158 Additionally, weight restrictions are cleared after 3-4 months (90%).

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163 **DISCUSSION**

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165 The most important finding of the present study was that finally a consensus could be found on several topics. True AP
166 view or a bilateral Zanca view were deemed sufficient for diagnosis, a separation line between acute and chronic was
167 set at 3 weeks from trauma, arthroscopically assisted anatomic reconstruction using synthetic augmentation has been
168 suggested in acute injuries, whereas the use of biological reconstruction with tendon graft was reserved to chronic
169 cases. Clarification on postoperative protocol and conservative management have also been made.

170 Since AC joint dislocations are plagued by limited evidence-based literature, the present consensus really shed light on
171 some controversial issues.

172 An emerging concept in the quest for a better understanding of AC joint pathology and improved clinical outcomes is
173 the complementary role of either coracoclavicular (CC) and AC ligaments. Decades ago, biomechanical studies have
174 clearly stated that CC ligaments are the main responsible for vertical stability, as well as AC ligaments and capsule are
175 the primary stabilizers in the horizontal plane [3, 9]. Since clinical data has shown a vast number of persistent
176 horizontal instability following modern arthroscopic AC joint reconstruction techniques [20], not only the surgical
177 management, but also the clinical assessment have been reconsidered.

178 It has been claimed that parameters assessable on AP and Zanca view do not allow for quantification of horizontal
179 instability, therefore, the use of new radiographic parameters in a single lateral Alexander view has been recently
180 recommended [26]. Anyhow, the ESA panel agreed that a true AP view or a bilateral Zanca view without loading the
181 arm are still adequate for a correct diagnosis, with no need of modified Alexander view to seek for horizontal
182 instability. On the contrary, the clinical evaluation was deemed sufficient to evaluate instability in the horizontal plane.
183 Similarly, recent papers called into question the reliability of the Rockwood classification [13, 18] and further stated
184 that, except for type IV, it does not assess horizontal instability [26]. Once again, the consensus clarified that the
185 Rockwood classification, recently modified by the ISAKOS statement [2], remains the most appropriate and
186 comprehensive classification to guide the treatment choice so far.

187 Moving forward, once the diagnosis has been made and the dislocation has been correctly classified, current literature
188 turned out to be unable to provide a clear demarcation line between acute and chronic dislocations. While some authors
189 considered acute dislocations those treated within 3 days after trauma [10, 24], some others still considered acute
190 injuries those treated up to 6 weeks after trauma [6, 14, 25]. The ESA panel unequivocally set the separation line at 3
191 weeks, but also defined a grey zone between acute and chronic ranging from 3 to 6 weeks. According to the ESA panel
192 this should be considered an important turning point when it comes to surgical management. Taking into account the
193 limited healing capacity of both CC and AC ligaments, definition of chronic setting clearly affects the surgical strategy.

194 As a matter of fact, a large consensus stated that arthroscopically-assisted reconstruction using a suspensory device
195 (synthetic) with no need for an additional biologic augmentation should be the treatment of choice in acute cases,
196 whereas biologic reconstruction to re-create not only CC ligaments, but also AC ligaments was deemed
197 necessary in chronic cases. In other words, the less healing response is expected, the more surgical stability, increased
198 by biological augmentation, is recommended. Moreover, biomechanical studies demonstrated that combined AC and
199 CC ligaments reconstruction provides better results than isolated CC reconstruction [8, 19].

200 Conservative treatment is once again an unclarified issue. It generally involves immobilization of the arm. Several type
201 of arm immobilizers have been proposed [22] ranging from a broadarm sling up to Kenny–Howard splint, taping and
202 casts. Immobilization can last from 3 days up to 3 weeks based on Rockwood type, subsiding pain and/or different
203 protocols available [17, 21]. Rehabilitation starts gradually after sling removal. Unfortunately, no previous studies
204 aimed to clarify whether one immobilizer is better than the other neither if a longer period of immobilization has a
205 biologic rationale, therefore the final decision is always up to the surgeon’s experience. The ESA panel aimed to
206 summarize the current literature, thus providing a sort of reasonable guideline to follow and a consensus has been
207 reached on this topic. Conservative management of low-grade AC joint dislocations was unified with postoperative
208 management of high-grade AC joint dislocations. Three weeks of immobilization seemed a reasonable time to provide
209 an initial biological ingrowth, thus avoiding risks related to a longer immobilization period (e.g. shoulder stiffness).
210 However, 6 weeks are warranted before regaining full range of motion and activities of daily living. Sports activities are
211 not allowed before 4 months. Anyhow, according to the ESA panel, pain still remains the main criteria for return to full
212 activities as well as to switch a conservative management into a surgical one.

213 Nevertheless, some issues still remain controversial and represents limitations of the present study. One for all, outcome
214 measures to evaluate the management of ACJ injuries are not consistently reported in the literature, therefore they could
215 not even be included in the consensus process. Further, the lack of uniformity in reported outcomes and the abundance
216 of conservative treatment protocols as well as surgical techniques reported in the literature make any kind of
217 comparison difficult or somehow inconclusive.

218 [Due to the lack of prospective randomized trials, this consensus statement is meant to be a guideline to get insight into](#)
219 [the complex topic of diagnosis and treatment of AC joint dislocations for the general orthopaedic surgeon and even for](#)
220 [shoulder specialists, respectively.](#)

222 CONCLUSIONS

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224 A consensus was reached on main topics of controversy. True AP view or a panoramic view (bilateral Zanca
225 radiographs) without loading of the arm was deemed sufficient for diagnosis. Horizontal instability can be identified
226 through clinical override testing during body cross test. The Rockwood classification, as modified by the ISAKOS
227 statement, is still considered the most valid so far. The separation line between acute and chronic cases was
228 consensually set at 3 weeks. Arthroscopically assisted anatomic reconstruction using a suspensory device (synthetic
229 augmentation) with no need of an additionally biological augmentation could be recommended in acute injuries,
230 whereas the use of biological reconstruction with tendon graft should be preferred in chronic cases, with the need to
231 address horizontal instability by reconstructing also the AC ligaments. Finally, the consensus showed no different
232 treatment strategies between conservative and postoperative care of high grade ACJ dislocation, recommending
233 immobilization for 3 weeks with a full range of motion activity allowed after 6 weeks.

234 The ESSKA-ESA section tried to fully investigate and clarify each step of the diagnostic treatment algorithm, aiming to
235 [give](#) surgeons [insight](#) into the [current](#) [concepts](#) [suggested](#) despite the [large](#)
236 [amount of](#) literature.

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240 **REFERENCES**

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309 **Figure and Table Legends**

310

311 Table 1:

312 Description of panel of clinicians who responded to the survey.

313

314 Figure 1:

315 Radiographic evaluation statements of the Delphi process which reached a consensus.

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317 Figure 2:

318 Classification statements of the Delphi process which reached a consensus.

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320 Figure 3:

321 Statements regarding treatment of acute AC joint seperatrions of the Delphi process which reached a consensus.

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323 Figure 4:

324 Statements regarding treatment of chronic AC joint seperatrions of the Delphi process which reached a consensus.

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326 Figure 5:

327 Statements regarding non-surgical treatment and postoperative rehabilitation of AC joint seperatrions of the Delphi
328 process which reached a consensus.

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