Therapeutic Results of the Modified Cadenat Procedure for Acromioclavicular Joint Separations Compared with the Modified Dewar Procedure

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ABSTRACT

Aim and Background: The surgical treatment for acromioclavicular joint dislocations is recommended for Rockwood’s classification types 4, 5 and 6. In this study, we evaluate the therapeutic results of the modified Cadenat procedure on type 5 acromioclavicular joint dislocation, and report on a comparative study of the modified Dewar procedure also on type 5 acromioclavicular joint dislocation.

Subjects and Methods: The modified Cadenat procedure was performed on 73 patients (66 males and 7 females, group C). The mean age at the time of the surgery was 35.4 years. On the other hand, the modified Dewar procedure was performed on 55 patients (51 males and 4 females, group D). The mean age at the time of the surgery was 34.5 years.

Results: The mean therapeutic results were 28.2 points in group C and 27.3 in group D according to the UCLA scoring system. In group C, the subluxation that represented less than 5 mm superior translation of the clavicle, occurred only in 18 of 73 patients. Meanwhile, in group D, the subluxation that represented less than 5 mm, occurred only in 14; that which represented 5 to 10 mm was in seven patients, and the complete dislocation occurred in three patients. Also, the occurrence of osteoarthritic changes in the acromioclavicular joint was nine patients in group C and 20 in group D, respectively.

Conclusion: The modified Cadenat procedure could provide satisfactory therapeutic results and avoid postoperative failure of reduction compared to the modified Dewar procedure. However, the modified Cadenat procedure does not aim to restore the anatomical coracoclavicular ligaments. It is believed that anatomic restoration of both coracoclavicular ligaments could best restore the function of the acromioclavicular joint.

Keywords: Acromioclavicular joint separation, modified Cadenat procedure, modified Dewar procedure.

Resultados Terapéuticos del Procedimiento de Cadenat Modificado para las Separaciones de la Articulación Acromioclavicular en Comparación con el Procedimiento de Dewar Modificado

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RESUMEN

Objetivo y Antecedentes: El tratamiento quirúrgico para las dislocaciones de la articulación acromioclavicular se recomienda para los tipos 4, 5, y 6 de la clasificación de Rockwood. En este estudio, se evalúan los resultados terapéuticos del procedimiento de Cadenat modificado en dislocación de la articulación acromioclavicular de tipo 5, y también se informa sobre el estudio comparativo con el procedimiento de Dewar modificado practicado sobre el tipo 5 de dislocación de la articulación acromioclavicular.

Sujetos y Métodos: El procedimiento de Cadenat modificado se realizó en 73 pacientes (66 varones y 7 hembras, grupo C). La edad promedio en el momento de la cirugía era 35.4 años. Por otro lado, el procedimiento de Dewar modificado se realizó en 55 pacientes (51 varones y 4 hembras, grupo D). La edad promedio en el momento de la cirugía era 34.5 años.

Resultados: Los resultados terapéuticos promedio fueron 28.2 puntos en el grupo C y 27.3 en el grupo D de acuerdo con el sistema de puntuación UCLA. En el grupo C, la subluxación que representó menos
Palabras claves: Separación de la articulación acromioclavicular, procedimiento de Cadenat modificado, procedimiento de Dewar modificado

INTRODUCCIÓN

Hay varios métodos de tratamiento, tanto conservativos y quirúrgicos, para las desviaciones acromioclavulares y luxaciones. Generalmente, el tratamiento quirúrgico se recomienda para los tipos 4, 5 y 6, según la clasificación de Rockwood (1). Sin embargo, hay argumentos para ambos tratamientos quirúrgicos y conservativos para el tipo 3 y 4, y 5 y 6, según la clasificación de Rockwood (1). En general, se recomienda el tratamiento quirúrgico para la luxación traumatológica de la articulación acromioclavicular.

MÉTODOS

Entre 1995 y 2006, se realizaron 73 procedimientos de Cadenat modificada, incluyendo 32 en el lado derecho y 32 en el lado izquierdo. Los pacientes se dividieron en tres grupos: A, B y C. El grupo A consistía en 51 hombres y 7 mujeres, con una edad media de 34.5 años. El grupo B consistió en 55 pacientes, con una edad media de 57.2 años. El grupo C consistió en 20 pacientes, con una edad media de 66 años. La duración de seguimiento posquirúrgico varió entre 2 años y 9 meses y 8 años y 10 meses (media de 4 años y 2 meses).

En 1917, Cadenat (7) reportó un método para la luxación acromioclavicular utilizando los ligamentos coracoacromiales. Desde 1998, se ha utilizado la técnica de Cadenat modificada para los pacientes con luxaciones acromioclavulares.

En 1995, se evaluaron los resultados terapéuticos del procedimiento de Cadenat modificado para luxaciones acromioclavulares, y se reportó en una comparación con el procedimiento de Dewar modificado. Sin embargo, el procedimiento de Cadenat modificado no se dirigió a restaurar los ligamentos coracoacromiales anatómicos. Se entiende que la restauración anatómica de ambos ligamentos coracoacromiales pudiera restaurar mejor la función de la articulación acromioclavicular.
using two Kirschner wires, preserving the intra-articular disc as much as possible and the torn capsule and acromioclavicular ligaments were sequentially repaired. Finally, the detached coracoid process with these muscles was fixed to the anterior side of the clavicle at about 3 cm from the distal edge of the clavicle, using a screw with spike washer (Fig. 7).

Postoperative treatments consisted of immobilization with Désault bandage for approximately two weeks. From
the third week onward, forward elevation by passive 
movement in the supine position and pendulum exercises 
were prescribed. The Kirschner wires were removed at five 
weeks, or the Wolter clavicle plate was removed at four 
months, postoperatively. Meanwhile, on the patients with 
modified Dewar procedure, the postoperative treatments 
consisted of immobilization with Velpeau bandage for approxi-
mately four weeks. From the sixth week onward, the forward 
elevation by passive movement in the supine position and 
pendulum exercises were prescribed. The Kirschner wires 
were removed at six weeks, postoperatively.

The therapeutic results were evaluated based on the 
UCLA scoring system (8) [30 points] which consisted of 
pain, function, range of motion and strength, excluding the 
patient’s satisfaction. Also, we evaluated the radiographic 
findings including the occurrence of osteoarthritic changes 
and the complete reduction or not in the acromioclavicular 
joint. On comparison between the two groups, the static 
analysis was evaluated, setting the level of significance at 
less than 0.05, by Mann-Whitney’s U test.

RESULTS
The therapeutic results were 24 to 30 (mean, 28.2) points in 
group C and 18 to 30 (mean, 27.3) points in group D 
doing to the UCLA scoring system. When details of the 
results were examined, no significant difference between 
group C and D was observed in each estimated criterion. 
However, fatigue and decrease of endurance on the shoulder 
girdle during exercise was confirmed in 29 out of 55 patients 
in group D, as compared to 12 out of 73 patients in group C. 
Regarding the postoperative range of motion, 59 of 73 
patients in group C recovered more than 160 degrees in 
forward elevation and 160 degrees in abduction at three 
months postoperatively, but 21 out of 55 patients in group D 
required approximately one year to gain that prior to injury.

The incidence of residual subluxation or dislocation in 
the acromioclavicular joint was evaluated with the final 
radiographic findings. In group C, the subluxation that 
represented less than 5 mm superior translation of the 
clavicle, occurred only in 18 (25%) of 73 patients. Meanwhile, 
in group D, the subluxation that represented less than 5 mm 
superior translation of the clavicle, occurred only in 14 
(25%), that representing 5–10 mm superior translation in 7 
patients (13%), and the complete dislocation occurred in 
three patients (5%). Also, the occurrence of osteoarthritic 
changes in the acromioclavicular joint was nine patients 
(12%) in group C and 20 patients (36%) in group D, respec-
tively.

DISCUSSION
Acromioclavicular joint separations are frequently treated in 
clinical practice. The degree or direction of translation of the 
clavicle against the acromion depends on the type of injury of 
the acromioclavicular and coracoclavicular ligaments, and 
the detachment of deltoid or trapezius muscles from the 
clavicle. Rockwood et al (1) or Tossy et al (9) classified the 
degree or direction of displacement in the acromioclavicular 
joint separations into six or three types. Generally, Types 4, 
5 and 6, based on Rockwood’s classification, are considered 
to be good indication for surgical treatment. However, there 
are some arguments for both surgical treatments and conser-
native treatments for type 3, and treatments for such have not 
been standardized. Kurokawa et al (10) performed conserva-
tive treatments on 14 patients with type 3 based on Tossy’s 
classification, and reported that they had no difficulty in 
activities of daily living and sports after treatments. How-
ever, they recognised weakness in muscle strength and 
fatigue on the shoulder girdle during exercise. On the other 
hand, there are many surgical treatments for acromioclavi-
cular joint separations, including repair of the acromioclavi-
cular ligaments [Phemister procedure (2) or Neviaser 
procedure (11)], fixation between the clavicle and the 
coracoid process [Bosworth procedure (3)], reconstruction 
of the coracoclavicular ligaments using the coracoclavicular 
ligaments [Weaver-Dunn procedure (4) and Cadenat proce-
dure], and dynamic stabilization of the coracoclavicular joint 
by the transferred conjoined tendon (Dewar procedure). 
Kanaya et al (12) performed the modified Neviaser 
procedure on 30 patients with acromioclavicular joint separations, 
and researched that about 50% of these patients had a 
residual subluxation or dislocation postoperatively. Terado 
(13) reconstructed the coracoclavicular ligaments using 
artificial ligament on six patients with type 3 based on 
Tossy’s classification. In relation to the postoperative radi-
ographic findings, only one patient could achieve the reduced 
position of acromioclavicular joint and three patients were 
confirmed to have erosions on the clavicle caused from the 
irritation of the artificial ligament. For the reconstructive 
procedure of the coracoclavicular ligaments which are com-
posed of the conoid and trapezoid ligaments, Morrison et al 
(14) and Hessmann et al (15) used the artificial ligaments, 
Jones et al (16) and Sloan et al (17) used the autogenous 
tendons, and Dimakopoulos et al (18) used some braided 
sutures as substitute ligaments. However, their procedures 
were not anatomical reconstruction of the coracoclavicular 
ligaments (19).

In this study, we performed two different surgical 
procedures, which were not anatomical reconstruction of the 
coracoclavicular ligaments, on the patients with acromio-
clavicular joint separations. The modified Dewar procedure

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Fig. 7: Postoperative findings (modified Dewar procedure).
has some disadvantages including a long period required for recovery of range of motion, and high frequency of residual subluxation or dislocation and postoperative osteoarthritic changes on the acromioclavicular joint. In particular, the high frequency of residual subluxation or dislocation and postoperative osteoarthritic changes on the acromioclavicular joint were considered to result from the dynamic stabilization of acromioclavicular joint by the conjoined tendons. Considering these disadvantages, we have performed modified Cadent procedure on the patients with acromioclavicular joint separations since 1995. The patients with the modified Cadent procedure needed 3.4 months to return to their own occupations such as construction work, and 3.1 months to return to sports activities. However, the modified Cadent procedure also has some disadvantages. The mechanism of stabilization of the acromioclavicular joint was established by the coracoacromial ligaments transferred from the acromion to the clavicle. The transferred coracoacromial ligament does not anatomically reconstruct either the conoid or trapezoid ligament which composes the coracoclavicular ligaments. The conoid ligaments are anatomically attached to the conoid tubercle which is located at the posterior edge of the clavicle, and the clavicle can make an axial rotation during forward elevation of the shoulder joint. However, in the modified Cadent procedure, it is possible that this axial rotation of the clavicle is restricted, because the transferred coracoacromial ligament is fixed to the anterior edge of the clavicle. For this reason, even if the separated acromioclavicular joint is reduced in normal position, it is still possible that the osteoarthritic changes on the acromioclavicular joint will occur. The Weaver-Dunn procedure, where the transferred coracoacromial ligaments are inserted into the distal edge of the resected clavicle, is close to the anatomical reconstruction of the trapezoid ligament. But, this procedure does not aim to reconstruct the anatomical acromioclavicular joint due to the distal clavicle resection.

CONCLUSIONS

The modified Cadent procedure could provide satisfactory therapeutic results and avoid postoperative failure or loss of reduction of the acromioclavicular joint separations compared to the modified Dewar procedure. However, the modified Cadent procedure does not aim to restore the anatomical coracoclavicular ligaments. We believe that the anatomical restoration of both the coracoclavicular ligaments could best restore the function of the acromioclavicular joint.

REFERENCES