Efficacy of Gentle Traction, Abduction and External Rotation Maneuver under Sedative-Free for Reduction of Acute Anterior Shoulder Dislocation: Retrospective Comparative Study

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Background: *Reduction technique of acute anterior shoulder dislocation is always performed under sedation or general anesthesia in order to permit successful reduction such as traction counter-traction (TCT). However, the patients take risks of sedation or anesthesia. There are several techniques of reduction that reduce the dislocation without using sedation or anesthesia such as Milch technique, gentle traction, abduction and external rotation (TAE) technique and scapular manipulation. In the present study, the authors compared efficacy of reduction of acute anterior shoulder dislocation by using TAE without sedation and TCT techniques under conscious sedation.*

Objective: *To compare efficacy of TAE without sedation and TCT techniques under conscious sedation for reduction of acute anterior shoulder dislocation.*

Material and Method: *Between 2001and 2010, the authors reviewed medical records and radiographs of 76 patients who sustained one or more episodes of acute anterior shoulder dislocation and divided into two groups. Group 1 used the technique of TAE without sedation. Group 2 used the technique of TCT under conscious sedation. Group 1 and 2 consisted of 32 and 44 patients, 24 and 33 males, eight and 11 females, average age 39.13 (17-71) and 34.77 (18-76) years old, 24 and 34 right sides, eight and 10 left sides, 21 and 24 from sport injuries and 10 and 18 non-sport injuries respectively. Successful reduction, post-reduction complication and patients' satisfaction score of 0 to 10 of both groups were evaluated and $p \leq 0.05$ were considered for statistical significant differences.*

Results: *The successful reduction of group 1, 2 were 90.63% (29/32) and 100% (44/44) with 95% Confidence interval 74.98 to 98.02% and 93.42 to 100% respectively. The statistical analysis showed no significant difference of both groups ($p = 0.071$). There was no post-reduction complication of both groups. The patients' satisfaction score of group 1, 2 were 9.38 (8-10) and 7.94 (3-10). The statistical analysis showed patients' satisfaction score of group 1 were significantly higher than group 2 ($p = 0.007$).*

Conclusion: *TAE technique under sedative-free for reduction of acute anterior shoulder dislocation is effective, simple, and safe.*

Keywords: *Gentle traction, Abduction, External rotation, Sedation, Sedative-free, Anterior shoulder dislocation, Efficacy, Patients' satisfaction*

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Acute anterior shoulder dislocation is the most common dislocation encountered in the emergency room[1]. There are several methods of reduction, however, with persistent requirement of general anesthesia or conscious sedation permitting successful reduction such as analgesics narcotics and sometimes even employing muscle relaxants, as well as assistance or use of some instruments. Kocher's maneuver, Stimson's, scapular manipulation, Eskimo, and traction-countertraction techniques are examples; however, their success rates vary from 74 to 89.4%[2-7]. The main problems of these techniques are not only the NPO time but also complications from anesthesia or sedation. There are several attempts to avoid the complications *i.e.* using intraarticular lidocaine

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injection into shoulder joint as alternative technique that may be taken into consideration when there are reasons to avoid anesthesia or sedation[8].

In 1975, a simple maneuver for reduction of acute anterior shoulder dislocation without using general anesthesia or conscious sedation, designed by Professor Dr. Thossart Harnroongroj, was reported in 32 patients who sustained anterior shoulder dislocation with high successful rate of reduction. The maneuver consists of gentle traction, abduction and external rotation of shoulder joint (TAE)[9].

However, there is no comparative study between TAE technique without sedation and other reduction techniques under conscious sedation in terms of success rate of reduction, complications of reduction and patients' satisfaction.

Material and Method

At the emergency room, Siriraj Hospital, Mahidol University, the traction-countertraction technique (TCT) under conscious sedation by using either intravenous 0.1-0.2 mg/kg morphine or 1-2 mg/kg pethidine combined with intravenous 0.1-0.2 mg/kg diazepam and TAE technique with sedative-free for reduction of anterior shoulder dislocation are mostly employed. Between 2001 and 2010, the authors reviewed 76 patients who sustained acute anterior shoulder dislocation under inclusion and exclusion criteria by using medical record and radiographs of the shoulder. The reduction technique of the dislocation was done by using TAE without sedation in the patients designated as group 1 whereas TCT with conscious sedation as group 2.

Inclusion criteria were all types of anterior shoulder dislocation and including association with fracture of greater tuberosity, one or more episodes of the dislocation, all ages, all occupations, and both genders. The reduction was performed by a first or second year orthopedic resident. The first and second year orthopedic residents were completely trained about management of orthopedic emergency at the first month of beginning the training program. Techniques of reduction of acute shoulder dislocation such as Milch, TAE and TCT were included at the beginning of the training program. For the fracture-dislocation of shoulder except association with fracture of greater tuberosity, dislocation caused by electrical shock or epilepsy, neglected or old dislocation, the reduction was performed by senior orthopedic residents or staff. Incomplete medical records and radiographs were excluded. Age, sex, site, number of episodes of dislocation and causes of dislocation recording in terms of sports or non-sports injury, neurovascular status of affected shoulders before and after reductions were recorded. Successful reduction was defined by one to three attempts of the performing maneuver, confirmed by Dugar's sign and/or post-reduction radiographs of the shoulder. Post-reduction complications were recorded as neuro-vascular injury and fracture around the shoulder and the extremity. Patient satisfaction was evaluated by the orthopedic resident who performed the reduction using visual analog scale of 0 to 10 scores just before discharge from the emergency room.

The data was analyzed for statistical significant difference between two groups by using Fisher's exact test for successful rate of the reduction, Mann-Whitney U test for patients' satisfaction score. The distribution of categorical variables between groups was analyzed by using Chi-square test or Fisher's exact test. P-value equal or less than 0.05 was considered significant. The present study was carried out after receiving a certificate of ethic approval from the Siriraj Institutional Review Board.

Results

There were 32 patients in group 1 and 44 patients in group 2. The demographic data of both groups are shown in Table 1. The successful rate of the reduction in group 1 was 90.63% (29/32) and in group 2 was 100% (44/44). Three patients in group 1 failed reduction after three attempts. However, the reduction of all three patients succeeded by one attempt of the TAE technique under conscious sedation. There was no post-reduction complication in both groups. Forty-two patients, which comprised of 24 patients in group 1 and 18 patients in group 2, were evaluated for patient's satisfaction. Average satisfaction visual analog score of group 1 was 9.38 (SD, 0.71) and of group 2 was 7.94 (SD, 1.89).

The statistical analysis of group 1 and 2 showed that the successful rate of reduction of anterior shoulder dislocations revealed no statistically significant difference ($p = 0.071$). The patients' satisfaction visual analog score of group 1 was significantly higher than of group 2 ($p = 0.007$).

Discussion

The results of study exhibited that TAE technique can be accomplished by the first or second year orthopedic residents with highly successful reduction rate and safely. The successful rate showed

Table 1. The demographic data of TAE without sedation group and TCT under sedation group

	Group		p-value
	TAE (n = 32)	TCT (n = 44)	
Sex			
Male	24 (75.00%)	33 (75.00%)	0.999
Female	8 (25.00%)	11 (25.00%)	
Age (yrs)	39.13 ± 18.17 (17-71 yrs)	34.77 ± 15.56 (18-76 yrs)	0.266
Site			
Right	24 (75.00%)	34 (77.27%)	0.818
Left	8 (25.00%)	10 (22.73%)	
Greater tuberosity fracture			
None	31 (96.88%)	44 (100%)	0.421
Present	1 (3.12%)	0	
Mechanism of injury	n = 31	n = 42	
Sports	21 (67.74%)	24 (57.14%)	0.357
Non-sports	10 (32.26%)	18 (42.86%)	
Episode of dislocation			
I	14 (43.75%)	22 (50.00%)	0.499
II	5 (15.63%)	11 (25.00%)	
III	5 (15.63%)	4 (9.09%)	
≥ IV	8 (25.00%)	7 (15.91%)	
Reduction results			
Success	29 (90.63%)	44 (100%)	0.071
Failure	3 (9.37%)	0	
95% CI of Success rate	74.98%-98.02%	93.42%-100%	
Complication			
None	32 (100%)	44 (100%)	-
Present	0	0	
Satisfaction score (0-10 scores)	n = 24	n = 18	
Mean ± SD	9.38 ± 0.71	7.94 ± 1.89	0.007
Min-Max	8-10	3-10	

TAE = traction abduction and external rotation; TCT = traction counter-traction

no statistical difference from TCT technique under sedation. The advantage of TAE over TCT techniques are neither sedation nor anesthesia is used and merely one surgeon could perform the maneuver of reduction without any assistant or instrument. Moreover, TAE need no time for post-reduction sedative or anesthetic recovery and thus no residual effects of sedation, which can shorten patient service time in the emergency room[9]. These may be reasons for higher patients' satisfaction scores in group 1. Reduction of anterior shoulder dislocation using TAE technique is performed at supine position, which is simple when compared with Eskimo, Stimson's, or scapular manipulation techniques. Based on these advantages, the TAE technique can be used as treatment of anterior shoulder dislocation encountered outside the hospital such as in a sports field, office, and home. In the present study, there were three failures of reduction by using TAE technique without sedation. Since they were early cases that received the service at the beginning of orthopedic residency training program, the orthopedic resident was not familiar with the TAE technique. However, only one attempt of TAE technique under conscious sedation for the reduction of the dislocations was permitted. Although TAE technique achieves high successful rate of reduction without using conscious sedation or general anesthesia, the authors suggest for better understanding and performance of TAE technique of orthopedist, the patient should be informed about the process and details of maneuver of TAE technique in order to facilitate the performing of reduction. Moreover, to

create a friendly atmosphere between orthopedist and patient could comfort and relax the patients. Successful reduction of anterior shoulder dislocation by TAE technique may depend on particular mechanism of reduction. When a gentle traction force is applied, the gradual abduction of shoulder follows and the humeral head moves outwards and rises upwards. The humeral head moves closely to the center of glenoid fossa during gentle traction at 50 to 90 degrees of shoulder abduction but the humeral head remains anterior to the glenoid until 30 to 45 degrees external rotation of shoulder is performed. The humeral head is disengaged from anterior glenoid rim and moves into the glenoid cavity. Thus, the successful reduction is obtained at 90 to 110 degrees of abduction and 30 to 45 degrees of external rotation[9].

From reviewed literature, there are several methods of reduction with 74.0 to 89.4% successful rate. However, 42.9 to 93.0% of patients have to be given anesthesia, narcotic, muscles relaxant to achieve the successful reduction[10]. In the present study, the TAE technique achieved 90.63% of successful rate of reduction without using sedation or anesthesia. However, there were only three unsuccessful reductions under sedation-free (which accounted only 9.37%), that consequently reach successful reduction under sedation.

In conclusion, TAE technique under sedative-free is effective, simple and safe for reduction of acute anterior shoulder dislocation.

Potential conflicts of interest

None.

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ประสิทธิภาพของการดึงหัวไหล่หลุดให้เข้าที่โดยใช้เทคนิค gentle traction, abduction และ external rotation โดยไม่ใช้ยา sedative: การศึกษาเปรียบเทียบย้อนหลัง

ทศ หาญรุ่งโรจน์, จุมพล ว่องพานิช, ทศศาสตร์ หาญรุ่งโรจน์

การดึงหัวไหล่หลุดให้เข้าที่มีหลายวิธี การดึงกระทำภายใต้การใช้ยา และไม่ใช้ยา sedative เพื่อให้ได้สัมฤทธิ์ผลมากที่สุดมักกระทำการดึงภายใต้การใช้ยา sedative ซึ่งอาจจะมีผลแทรกซ้อนและอาการไม่พึงประสงค์ของยา เพื่อให้ทราบถึงความสัมฤทธิ์ผลของการดึงหัวไหล่ ผลแทรกซ้อน และความพึงพอใจของผู้ป่วยทั้ง 2 วิธีนี้ คณะผู้นิพนธ์ได้ศึกษาผู้ป่วยหัวไหล่หลุดที่มารับการรักษาที่ห้องฉุกเฉิน โรงพยาบาลศิริราช คณะแพทยศาสตร์ศิริราชพยาบาล ตั้งแต่ ปี พ.ศ. 2544-2553 จำนวน 76 ราย ที่หัวไหล่หลุดตั้งแต่หนึ่งครั้งขึ้นไป โดยแบ่งการศึกษาเป็น 2 กลุ่ม กลุ่ม 1 ใช้เทคนิคการดึง gentle traction, abduction และ external rotation (TAE) โดยไม่ใช้ยา sedative กลุ่ม 2 ใช้เทคนิค traction countertraction (TCT) ภายใต้การใช้ยา sedative กลุ่ม 1 และ 2 ประกอบด้วยผู้ป่วย 32, 44 ราย ตามลำดับ ชาย 24, 33 ราย หญิง 8, 11 ราย อายุเฉลี่ย 39.13 ปี (17-71 ปี), 34.77 ปี (18-76 ปี) ตามลำดับ ไหล่ขวา 24, 34 ข้าง ไหล่ซ้าย 8, 10 ข้าง สาเหตุการหลุดของหัวไหล่จาก sports 21, 24 ราย non-sports 10, 18 ราย ตามลำดับ ผลต่างความสัมฤทธิ์ผลของการดึงหัวไหล่หลุดให้เข้าที่ในกลุ่ม 1, 2 เป็น 90.63% (29/32), 100% (44/44) โดยมี 95% confidence interval 74.98-98.02% และ 93.42-100% ตามลำดับ โดยไม่มีผลแทรกซ้อนจากการดึงหัวไหล่ทั้งสองกลุ่ม การวิเคราะห์ทางสถิติพบว่า ความสัมฤทธิ์ผลในการดึงหัวไหล่ของทั้งสองกลุ่มไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ (p = 0.071) แต่อย่างไรก็ตาม ความพึงพอใจของผู้ป่วย พบว่าคะแนนของกลุ่ม 1 คือ 9.38 (8-10) และ กลุ่ม 2 คือ 7.94 (3-10) ซึ่งกลุ่ม 1 สูงกว่า กลุ่ม 2 อย่างมีนัยสำคัญทางสถิติ (p = 0.007) ฉะนั้น โดยสรุป การดึงหัวไหล่หลุดให้เข้าที่ด้วยเทคนิค TAE โดยไม่ต้องใช้ยา sedative ให้ความสัมฤทธิ์ผลไม่แตกต่างกันอย่างมีนัยสำคัญสถิติจากเทคนิค TCT ที่ดึงภายใต้การใช้ยา sedative ทำให้หลีกเลี่ยงภาวะแทรกซ้อนจากการใช้ยา และยังให้ผลความพึงพอใจของผู้ป่วยที่มากกว่าอย่างมีนัยสำคัญทางสถิติ