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Dr. Abhishek Agarwal
Assistant Professor, Department of Orthopaedics King Georges Medical University, Lucknow, Uttar Pradesh, India

Dr. Ekansh Debuka
Senior Resident, Department of Orthopaedics, King Georges Medical University, Lucknow, Uttar Pradesh, India

Dr. Ajai Singh
Professor, Department of Orthopaedics, King Georges Medical University, Lucknow, Uttar Pradesh, India

Dr. Vineet Sharma
Professor & Head, Department of Orthopaedics, King Georges Medical University, Lucknow, Uttar Pradesh, India

Dr. Bipin Kumar
Junior Resident, Department of Orthopaedics, King Georges Medical University, Lucknow, Uttar Pradesh, India

Correspondence
Dr. Abhishek Agarwal
Assistant Professor, Department of Orthopaedics King Georges Medical University, Lucknow, Uttar Pradesh, India

Outdoor tri-sequential (external rotation-adduction-internal rotation) technique for acute traumatic anterior shoulder dislocation

Dr. Abhishek Agarwal, Dr. Ekansh Debuka, Dr. Ajai Singh, Dr. Vineet Sharma and Dr. Bipin Kumar

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Abstract
Background: Shoulder dislocations accounts for half of the all joint dislocations, and of them 95-98% are anterior dislocations. This prospective study was conducted to delineate the role of tri-sequential technique in reduction which is easy, safe and reproducible.
Materials and methods: This Prospective study was conducted in Department of Orthopaedics, King George's Medical University, Lucknow over a period Between Jan 2017-July 2018 al shoulder were reduced either in outdoor or orthopedic emergency unit which is a tertiary care centre. Where we evaluated type of dislocations, safety, effectivity of the maneuver and comparison with the other technique was done.
Results: Out of 34 patients, 100% success rate was observed in only dislocations and average time in reduction was found to be <2mins. The Average VAS pain Scores experienced while reduction was ranged <5. None of the patients encountered any complication.
Conclusion: This Tri-sequential technique is very safe, reliable and easily reproducible even in the hands of level 1 health care provider without any risk of complication which even does not require any assistant or hospitalization.

Keywords: Tri-sequential, anterior shoulder dislocation, external rotation, adduction, internal rotation

Introduction
Today's era of fast outdoor life exposes the individuals to various minor and major road traffic accidents in which dislocations represent a vast majority of repercussions after trauma. shoulder dislocation accounts for almost half them .95 to 98 percents are anterior dislocations due to shallow concavity of glenoid cup which makes shoulder joint highly mobile and unstable [1-4]. It should not be forgotten that in countries like India these emergencies are first encountered by local practitioners (non-orthopedic personnel) who don't even know the anatomy and various forces governing the shoulder joint, mechanism of injury. These paramedical staff or many at times quacks land up in failure of reduction or creating an iatrogenic fracture by attempting reduction by unaccustomed traction without knowing the mechanism. Though there are multiple techniques described traditionally but at present time no proper protocol is defined which governs pre to post reduction scenario with follow up tenure various questions are still unanswered [5-6] e.g.

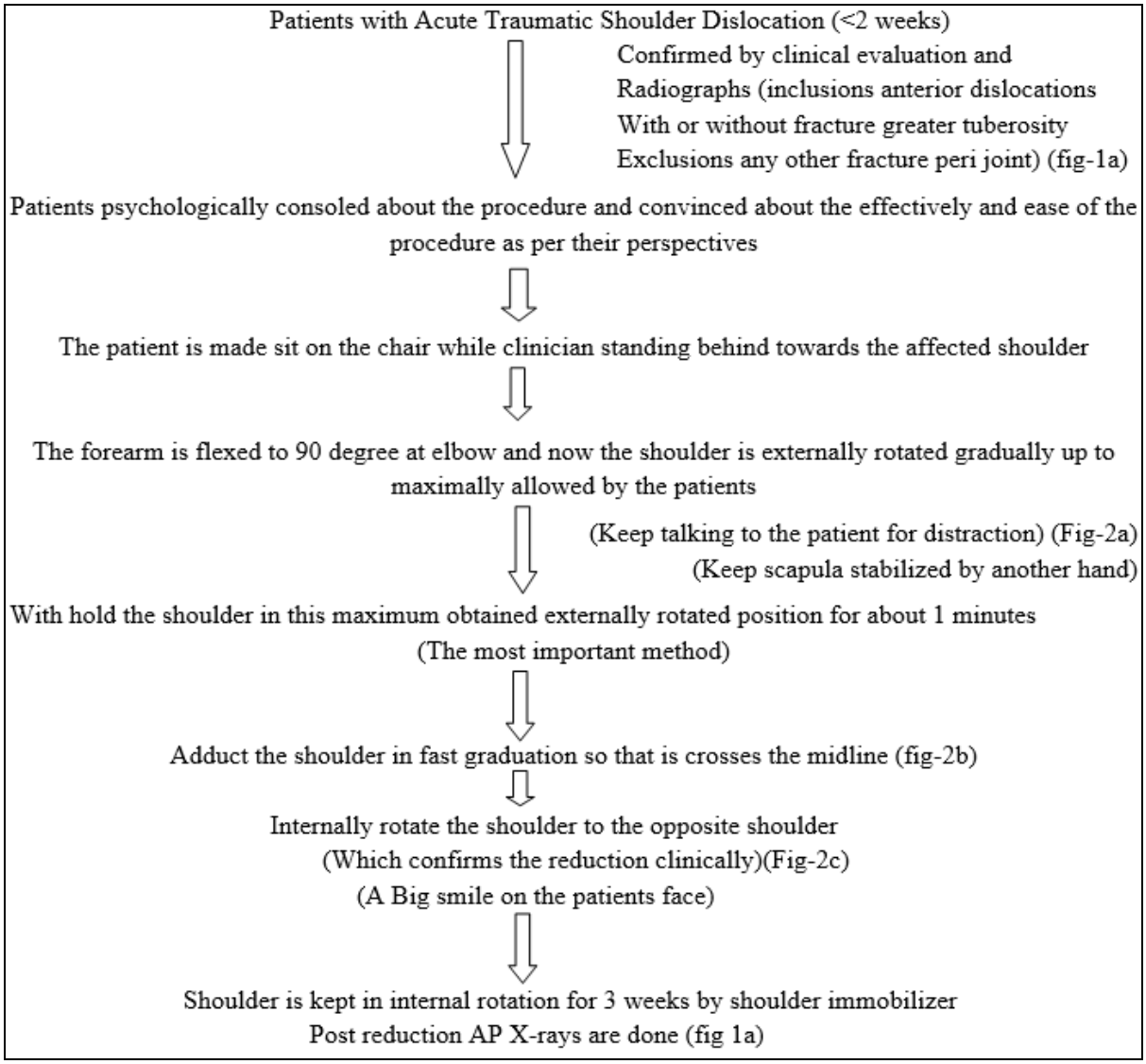
- Most easy and safe method
- Requirement of intra articular analgesia
- Sedation
- General anesthesia

So in our study we are reporting our experiences of using this Tri-Sequential technique to reduce acute traumatic anterior shoulder dislocation which is easy, safe and reproducible maneuver and can give consistent results even in the hands of level I health care providers.

Materials and Method

This Prospective study of managing a cute traumatic anterior shoulder dislocation using this trisequential technique was conducted in Department of Orthopedic, King Georges Medical University, Lucknow OPD and Orthopedic emergency unit between Jan 2017-July 2018 and is being continued. After getting approval of Institutional Ethics Committee, Research Cell, KGMU, Lucknow.

Reduction Technique



Results and Discussion

Patients were treated at time zero by clinicians (Author and team).

Out of 34 patients, 17.6% (6) reached us after a week with their shoulder manipulated elsewhere which indicates the earlier handling of their shoulder by inexperienced hands with faulty technique, in comparison to all other traditional methods of reduction our technique requires no sedation, no analgesia, no assistant and does not make patient to lie supine (table 1). In various other maneuvers like milch or kocher's [9-13,15-17] a form of traction is required which not only produce a great amount of patient discomfort and pain aggravation but makes reduction more difficult by inducing muscle spasm. This technique also forbids the use of any prop like traction towel or stockinet. Time required in our reduction technique was experienced to be less than 2 minutes (mean 1.58 min).

Our technique is an outdoor technique which does not need any assistant or hospitalization. (Table 1)

Average VAS score experienced by subjects while reduction is less than 5(as is performed making patient comfortable and kept distracted to different talks while the maneuver) which is very less as compared to an average of 8 in other traditionally described ones. (Table 1)

We experienced 100% success of reduction in plain dislocation or with undisplaced fracture greater tuberosity in first attempt, while 85% success rate in dislocation with displaced fracture greater tuberosity in either first or subsequent attempt. Rest 15% required reduction under general anesthesia as with displaced fracture greater tuberosity, the misaligned rotator cuff hinders the reduction.

Kuhn [7] presented the best available answer to many available methods regarding various management protocol but reports limited data available regarding the best one and premedication. Baykal (14) and colleagues reported the use of scapular manipulation with considerable success rate but requires traction and an assistant. (Table 2).

Ashton and Hassan [8] carried out a review to establish whether Kocher's or Milch's technique was better but the bottom line was its just individual preference and not supported by the evidence (Table 2).

Various methods of anaesthesia are available like General anesthesia to intra articular lidocaine described by Pradhan *et al.* which requires vitals monitoring or hospitalization [18].

Table 1: Observed mean findings

Out of 34 patients Male/Female-28/06		
<30 yrs	13	
30-50 yrs	15	
>50 yrs	06 with mean age 48	
25 dislocations	09 dislocation with fracture greater tuberosity	4 undisplaced
		5 displaced
Average time of reduction		1.58 minutes in only dislocations
		2.5 minutes in dislocations with fracture got reduced in first attempts
		5.6 minutes which required 2nd attempts including the recess period
Pain VAS Score experienced during the maneuver		No patients
0-2		0
2-5		24
5-8		10
>8		0

Table 2: Comparison of different parameters in Reduction amongst various techniques with our's

parameter	Milch's	Traction/countertraction	Spaso's	Stimpson's	Kocher's	Trisequential (ours)
Sedation/GA	+/-	+/-	-	-	+/-	-
Intraarticular injection	+/-	+/-	+/-	+/-	+/-	-
Position of the patient	supine	supine	supine	prone	supine	seated
Average time required	5-10mins	8-10mins	5-8mins	10-15mins	8-10mins	< 2mins
Assistant required	+	+	-	-	+	-
Any prop required	+/-	+/-	-	-	+/-	-
traction	+	+	+/-	+ gravity	+	-
Pain (VAS) perceived if not sedated	8-10	9-10	6-8	6-8	8-10	<5
Success rate in first attempt	75-95%	80%	90%	70%	75%	100%

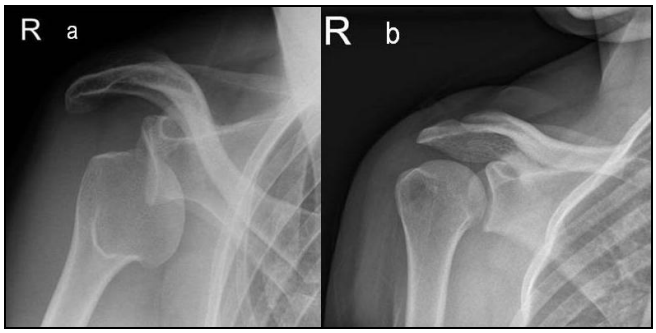


Fig 1: Showing X-ray of a. Anterior Dislocation of shoulder; b. Dislocation reduced

Fig 2: Showing steps of reduction maneuver; **a.** in maximal external rotation with scapula stablised and holding it in this position for 1 minute; **b.** Adduction in fast graduation to mid line; **c.** internal rotation to opposite shoulder

Conclusion

To conclude we can say that this Tri Sequential technique is a very safe, easy, consistent and easily reproducible maneuver even in the hands of grass root level health worker which not only gives immediate relief to the troubled patients but neither require any assistant nor hospitalization. We limit our study to the reduction technique only as to answer some other questions like surgical verses conservative management or immobilization in external verses internal rotation(as quoted in some studies) [19-26], A large study with longer follow-up is required.

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