

Original article

Role of 3D Computed Tomography in management of Scapular fracture

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ABSTRACT:

Introduction: Optimal treatment of scapular fractures poses diagnostic challenge as detection on plain radiograph is obscured due to overlying structures. The primary goal of this study is to objectify the need of 3 D computed tomography scans and its role in clinical decision post trauma to scapular region and present various aspect in management of scapular fracture.

Methodology: We evaluated injury radiographs and three-dimensional CT images of 45 patients with scapular fractures reporting department of orthopaedics and emergency trauma at esic bihta.

Results and Conclusion: Classification as well treatment protocol of scapular body fractures almost always require 3 D CT including subtraction of surrounding bone. It respects the anatomical structure of scapula as well as serves as therapeutic guidance in pre-operative planning. xray alone are misleading and often intraoperative findings seldom match with them

Keywords: Scapula, 3 dimensional computed tomography reconstruction

INTRODUCTION

The diagnosis and characterization of scapular fractures can be difficult, resulting in missed or delayed diagnosis of this injury thus leading potentially to malunion and persistent shoulder symptoms or loss of arm function The anatomical structure of shoulder articulation is complicated and therefore involves complex injuries which often appear in shoulder traumas which are difficult to diagnose precisely with the use of conventional radiograms. Conventional radiograms seldom provide precision details of fractured fragments in scapular fractures due to complex anatomical structures of shoulder and scapula. In cases of complicated injuries appropriate treatment is significantly dependent on precise fracture location & its spatial relation with other fracture fragments. The purpose of this study was to assess the diagnostic value 3-D CT reconstruction in scapular fractu

MATERIAL AND METHODS

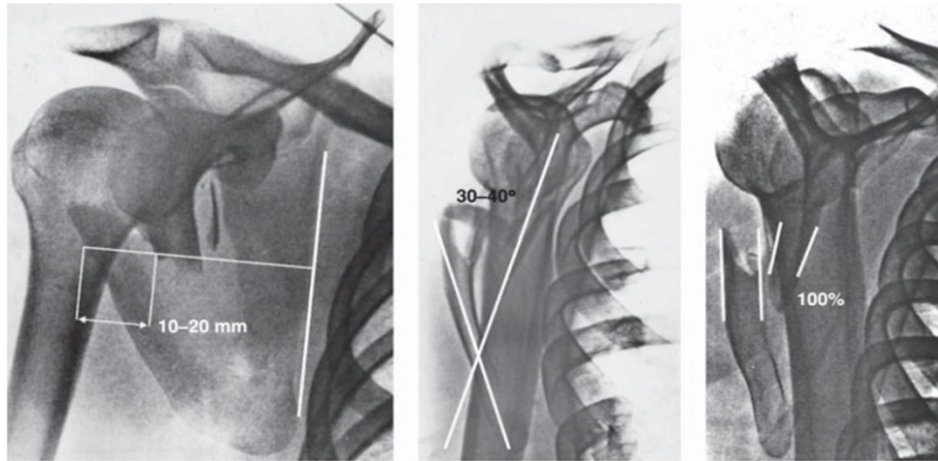
After getting approval from Institutional Ethics Committee (IEC), this prospective study was carried out in the department of orthopaedics, esic

medical college Hospital,bihta between 10 october 2021 and 31 setember 2022. It included 45 adult patients (above 18years age) with fracture of scapula. Patients with pathological fractures, underlying neuromuscular disorders and congenital bone disorders e.g. osteogenesis imperfecta was excluded from the study.

As soon as the patient presented in the department a primary survey was carried out with recording of the vitals and limb assessment for neurovascular compromise. The fractured part was appropriately splinted. Intravenous fluids & blood transfusion (wherever necessary) and analgesics were given.

We evaluated injury radiographs and three-dimensional CT images of 45 patients with extra-articular scapular fracture assessed there characteristics on the basis of current classification system and compared them with 3 d ct. The fracture were classified into 3 basic type spinal pillar, lateral pillar and both pillar .

Indication for surgery was considered medialisation 10-20 mm,angulation 30-45 &100% displacement as described by cole².



Measurement of displacement of fractures of the scapular body or scapular neck.

A: Mediolateral displacement. B: Angular displacement. C: Translational displacement.

Figure 1.A mediolateral displacement on AP radiograph. B. angular displacement measurement on Y view radiograph. C. displacement of fracture fragments on Y view .(courtesy rockwood and green page 1480)¹

RESULTS

scapular fracture were identified into three groups involving spinal pilaar ,lateral pillar and both pillar.

fracture type	number	%	m/f	Clavicle fracture	Average age
Spinal pillar	2	5	all male	0	32
Lateral pillar	34	75	33/1	2	45
Both pillar	9	20	All male	0	43
total	45	100	44/1	2	40

Subclassification of scapular pillar fracture detail overview

Fracture type	number	%	m/f	age	r/l	Clavicular fracture
Spinal pillar	2	5	All male	32	2/0	0
Lateral pillar	34	75	33/1	45	17/17	2
2 part	15	33	14/1	-	9/7	1
3 part	8	17	All male	-	4/2	1
communited	11	24	-do-	-	4/8	0
Both pillar	9	20	-do-	43	5/4	0
medial	3	6.6	-do-	-	3/2	0
central	6	13	-do-	-	2/2	0
total	45	100	44/1	40		2

DISCUSSION:

Upper half of lateral pillar: it is the most critical site crossed by all fracture lines⁴, Classification of fracture in view of involvement of scapular body is simple as pillars are ideal site of fixation . M/C fracture pattern was 2 part fracture of lateral pillar (fracture of infraspinous pillar) earlier wrongly

called as infraglenoid neck fracture .(# line doesnot separate glenoid fossafrom scapular body but splits infraspinous body. fractures of lateral pillar are always more displaced than spinal pillars , most frequently operated are 2 part fracture of lateral pillar (36%) & fracture of both pillar (33%) Fracture of lateral pillar always requires reduction

and internal fixation of lateral border scapular body. In fractures of both pillars involving central part of spinal pillar, it is fixed with internal fixation of both pillars. Extraarticular fractures of the coracoid process, acromion process, neck, body, and spine account for the majority of scapular fractures.

3-D CT is a surface rendition. It is performed with the help of a sophisticated software programme. The procedure consists of obtaining plain axial scans of the region of interest. The computer is then provided with a carefully selected 'threshold' attenuation value. CT scans are very helpful for the evaluation of the glenoid fossa and, where necessary, of the processes of the scapula. They, however, do not allow for a correct determination of the fracture types, those of the scapular body and neck in particular. Three-dimensional CT (3D CT) reconstruction is the only method allowing for the determination of the exact types of scapula fracture.

In these reconstructions it is necessary to image the scapula from three standardized views, i.e. from posterior, anterior and lateral aspects, after subtraction of the ribs, the proximal humerus and the clavicle.

CONCLUSION:

From this study we may conclude, always search for associated injuries. Rule out chest trauma and neurological insult, whenever suspicion in CXR, get a 3d CT done. Acceptable surgical indication: Fracture displacement >20mm Angulation >45* GPA < 20* Intra-articular step >4mm/>25% glenoid involved. Displaced double disruption of SSSC.(superior shoulder suspensory complex). Classification as well treatment protocol of scapular body fractures almost always require 3 d ct including subtraction of surrounding bone. It respects the anatomical structure of scapula as well as serves as therapeutic guidance in pre-operative planning.

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