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SURGICAL MANAGEMENT OF ISOLATED STERNAL FRACTURES

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Summary: Ten patients with isolated sternal fracture are managed in the department of Thoracic and Cardiovascular Surgery between 1985 and 1990. The average age of the patients was 36.7. Most of the patients(90%) had been traumatized as a result of traffic accident. Fractures were in corpus sterni. In six patients the fragments of sternal fractures were seperated, and the fragments were overridden.Two patients had hematom as on sternum,one patient had pneumothorax and the other one had hemothorax. The ECG of three patients showed marked ST-T changes,and the blood biochemistry of four showed increased CPK,SGOT and LDH.One patient with seperated sternal fracture was managed by closed reduction,and four patients were managed by surgical reduction with heavy wire. The remaining patients were treated conservatively.No complication occured on any patient.

Key words : Sternal fracture, surgical management

Sternal fractures,are rare injuries when compared to fractures of other bones and usually caused by automobile accidents. Considering the relative scarcity of publications about the management of sternal fractures,these cases are thought to be wortwhile for discussion.

MATERIAL AND METHOD

The patients managed between 1985 and 1990 are reviewed in terms of location, shape, complications,management and results of fractures.

RESULTS

Ten patients were managed with the diagnosis of sternal fracture in our department in the past five years. The average age was 36.7.Excepting one case,the patients had been traumatized by automobile accidents.Most of the sternal fractures(60%) were localized in corpus sterni.Two patients,had unseperated sternomanubrial fracture,and two of the patients had sternal fracture in the lower one-third of the sternum. In five patients, the fractured segments were seperated and overridden. Two patients had presternal hematomas.The average time elapsed from accident to the operation was 7.8 hours.One patient had pneumothorax and the other had hemothorax. ST-T changes in the ECG of three patients,and increased levels of CPK,SGOT and LDH were noted in four patients. One patient was managed by closed

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manipulation with hyperextension of spine,and four patients were managed by surgical fixation with heavy wire.No comlications occured in any patient. The patients were discharged within seven days after treatment.Table 1 outlines the data about the patients.

DISCUSSION

Sternal fractures are relatively rare compared to the other fractures(1.3). The incidence is increasing continually because of the increased number and speed capabilities of the automobiles(3).Sternal fractures are observed in a ratio of 0.9 percent in all thoracal traumas evaluated in our department.

TABLE I: Patient Data

Patient Nr.	Age& Sex	Mechanism of Injury	Site of sternal fracture	ECG	Enzyme	Time of operation (*)	Treatment
1. Mμ	42m	Automobile accident	Mid-body	Normal	Normal	-	Conservative
2. SE	27m	Automobile accident	Mid-body	Normal	Normal	-	Conservative
3. SE	34m	Automobile accident	Sternomanubrial	Normal	Normal	-	Conservative
4. OK	23m	Automobile accident	Lower sternum	Normal	Normal	-	Conservative
5. SM	48m	Automobile accident	Lower sternum	ST-T ch.	Inc.LDH	3 hours	Surgical fix
6. HB	31m	Automobile accident	Mid-body	Normal	Inc.LDH	9 hours	Surgical fix.
7. KM	45m	Automobile accident	Mid-body	ST-T ch.	Inc.CPK	13 hours	Surgical fix
8. μC	47m	Falling down the stairs	Mid-body	Normal	Inc.GOT	12 hours	Surgical fix
9. SK	34f	Automobile accident	Sternomanubrial	Normal	Normal	-	Conservative
10. LM	36f	Automobile accident	Mid-body	ST-T ch.	Normal	-	Closed reduc

(*) The interval from accident to the operation ST-T ch.=ST-T changes,Inc.LDH (CPK,GOT)=increased LDH (CPK,GOT),Surgical fix.=surgical fixation,Closed reduc.=closed reduction m=male, f=female

Sternal fractures occur either with a direct blow onto anterior chest wall as in traffic accidents or less commonly a violent flexion-compression injury to the thoracic spine often accompanied by a significant spine and head trauma (1).The reason was a traffic accident in most of our caces (90%).Fractures usually occured in sternomanubrial joint (3). In our series the fractures commonly occured in mid-body.The most striking finding in these cases was the overridding fracture segments forming a wedge, which caused trouble during the open reduction.

It is thought that the violent pain on the anterior chest wall may be related with sternal fracture.Visible sings like ecchymosis or contusion may be present on the anterior chest wall.There was a manifest presternal hematoma in one of our patients (Figure 1).The seperated fracture was palpable because of overridden fragments in all the patients. The diagnosis is definite when sternal fragments are seen in lateral chest graphies. The fragments were overridden in half of our cases. Cardiac contusion should be kept in mind in cases with in sternal

fractures. Electrocardiographic and enzymatic changes of possible cardiac complications existed in 40 percent of our cases.

After the patients state is stabilized,sternal fracture can simply be managed by closed manipulation (2). This approach was succesful in one of our patients.When closed reduction fails,open reduction and internal fixation may be necessary.Surgery(i.e.,open reduction) is applied in case of the following: (a) Failure of chest wall movements and the need for stabilization of the chest wall to prevent pulmonory insufficiency,(b) Violent pain,(c) Deformity caused by fraction,(d) Overridden fragments,(e) Failure of closed reduction (1-5).Surgical fixation was applied in 40 per cent of our cases.Either longitudinal midsternal incision (3-5) or transvers incision paralleled to sternal fracture-line (1) is prefered.In most of our cases a longitudinal midline 8-10 cm incision was made over the fracture side.Reduction can be performed with (a) Steinman or Kirschner pin or heavy wire sutures in internal fixation or (b) external fixation.We fixed the sternum with heavy wire sutures across the fracture site. Heavy wires are passed through both the inner outer tables of sternum.We placed a spoon not to give harm to the substernal structures (Figure 2).The full recovery of fraction is expected 1.5 or 3 months.

In any patient with sternal pain following thoracic injury sternal fracture should be suspected and managed accordingly after verifying the diagnosis.

Figure 1. Presternal hematoma in our patient our patient with sternal fracture.

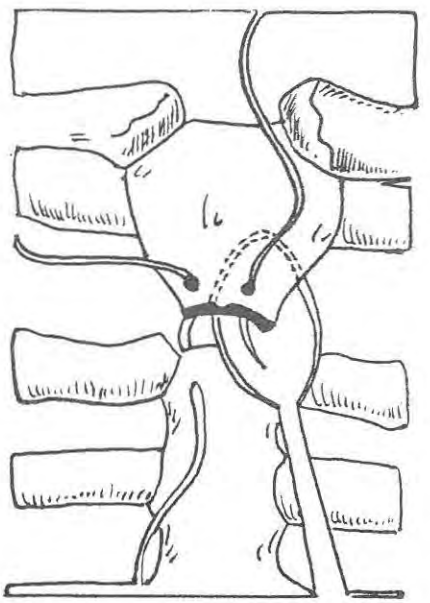

Figure 2. The insertion of a sterile tablespoon under the proximal segment of the fracture to prevent injury to underiying structures.

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