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RESEARCH ARTICLE

SURGICAL MANAGEMENT OF MALLEOLAR FRACTURES

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Abstract

Background and Objectives: One of the most frequent fractures in lower extremities is an ankle fracture. Because the ankle joint transmits body weight, acute injuries to it become more significant. If anatomical reduction is maintained, conservative treatment is effective for many ankle fractures. Another unstable, displaced, and open fractures require open reduction and internal fixation as surgical operations. Researchobjective has been to examine efficacy, functional results, and side effects of surgically treating ankle malleolar fractures.
Methods: 30 patients that had been admitted with malleolar fractures and treated using AO system and Lauge-Hansen's categorization are subjects of prospective study. The minimal duration of follow-up period had been 6 months. Olerud and Molander's scoring method has been employed for evaluating results.
Results: In this research,excellent results reportedin 18(60%) cases,good results were found in 06(20%)cases,fair results were found in 04(13.33%)cases,poor results were found in 02(6.66%) cases according to Olerud-Molander ankle score.
Interpretation And Conclusion: Auto collisions (RTAs) were the biggest contributor to malleolar fractures. The most frequent injuries were from supination external rotation. Anatomical reduction is required for a favourable functional outcome regardless of the type of surgery. The issues were dealt with in two weeks and were not severe.

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Introduction:-

Among the most prevalent lower limb fractures is an ankle fracture. Although approximately 2% of ankle fractures are open, they constitute 10% of all fractures and a significant amount of trauma load [(1)]. Following twisting injuries, car crashes, and falls, sports injuries are the second most frequent cause of ankle fractures[(2)]. In persons over forty, obesity and diabetes mellitus are major comorbidities[(3)]. Ankle fractures are classified employing Lauge-Hansen Classification[(4)].

There are three methods for treating malleolar fractures: nonsurgical, staged, and surgical. Stable ankle fractures are typically managed non-surgically, whereas those that are unstable could be treated surgically[(5)].

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Favourable results could be achieved with immobilization and non-operative treatment if anatomical reduction is maintained and constantly monitored. However, cast immobilization could be factor in cartilage deterioration, muscle atrophy, stiff, painful, and swollen joints[6]. External fixation and delayed internal fixation are the two stages of treatment for high-energy injuries or fracture-dislocations with soft tissue damage [7]. Surgical alternative therapy includes open reduction and internal fixation of fractured bone employing screws, metal plates, tension bands, or external fixation[8]. Stability and anatomical reduction are objectives of these treatments, that enable rapid mobility. Surgical complications including amputation, implant failure, pulmonary embolism, wound infection, and repeat surgery [9].

In undisplaced fractures, a non-operative approach may be appropriate, although for over 40 years, surgical treatment has been preferred[10]. Inappropriate treatment of malleolar fractures may lead to agonisingarthritis[11]. The impact of accurate anatomical reduction and solid stabilization in malleolar fractures cannot be overstated[12].

Methodology:-

This prospective investigation includes 30 patients treated at Dr PSIMS & RF, China Avutapally, for recent unimalleolar, bimalleolar, and trimalleolar fractures. Anterio posterior view and lateral view X-rays of patient's ankle joints were obtained. Complete examination of the injury's cause and any related illnesses is obtained. After assessing the patient's health in general, an extensive physical exam was carried out.

Surgical Technique:

Under spinal anaesthesia, each procedure has been conducted without application of tourniquet. First bone to be exposed was the fibula. Removal of hematoma from fracture site results in reduction and healing of fracture. Upon removing soft tissue interposition, fracture had reduced. For ORIF of malleolar fractures, semi-tubular plating, K-wire fixation, tension bandwiring, or cancellous screws were employed. Olerud-Molander Ankle Score has been employed for conducting 4-month follow-up.

Results:-

Mode Of Injury

Table 1:-

"MODEOFINJURY		
RoadTrafficAccident	-	16
Twistinginjury/self fall	-	10
Fallfromheight	-	4"

Malleolarity

Table 2:-

Unimalleolarfractures-	10
Bimalleolarfractures-	18
Trimalleolarfractures-	2

Current research reported that fractures: unimalleolar, trimalleolar, and bimalleolar had been 33.33, 6.66and 60%, respectively.

Injury Pattern

Injurypatternbased onLauge-Hansenclassificationisasfollows[4]:

Table 3:[4]

"Injurypattern	Numberofcases
Supination-Externalrotation	18
Pronation-Externalrotation	7
Supination-Adduction	3
Pronation-Abduction	2"

The most frequent injury in current research is supination-external rotation (60%) and least common is pronation abduction (6.66%).

Results:-

Olerud-Molander ankle score has been employed for examining results.[19]

Table 4:- Olerud-Molanderanklescore[19]

Parameters		**Score**
1."Pain	Never	25
	Whilewalkingonunevensurface	20
	Whilewalkingonevensurfacesoutdoors	10
	Whilewalkingindoors	05
	Constantandsevere	0
2.Stiffness	None	10
	Present	0
3.Swelling	None	10
	Onlyevenings	05
	Constant	0
4.Stairclimbing	Noproblems	10
	Impaired	05
	Impossible	0
5.Running	Possible	05"
	"Impossible	0
6.Jumping	Possible	05
	Impossible	0
7.Squating	No problems	05
	Impossible	0
8.Typeof supports	None	10
	Taping,wrapping	05
	Stickorcrutch	0
9.Workand Activities of daily life	Sameasbeforeinjury	20
	Changetopart-timework/Simplerjob	15
	Severelyimpairedworkcapacity	0"

"Poor:0-60%,Fair:61-80%,Good:81-90%,Excellent:91-100%."

Follow- upwasdoneuntilfractureunion.Resultswereanalyzedclinically& radiographically. Union was seen in all the fractures at the end of 10 weeks.

Following are our patients' overall functional results:

Table 5:-[19]

Results	**No.ofpatients**	**Percentage(%)**
"Excellent (>90%)	18	60
Good(81%-90%)	06	20
Fair(61%-80%)	04	13.33
Poor(<60%)	02	6.66"

Complications

Post-surgery, following complications had been observed. Superficialinfectionswithandwithoutskinnecrosis.

FIXATION OF LATERAL MALLUOLUS WITH SEMI TUBULAR PLATE

Fig 1 : Draping of the Limb

Fig 2 : Lateral Skin Incision for Lateral Malleolus

Fig 3 : Exposure of Fracture in Lateral Malleolus

Fig 4 : Fracture Site Reduced

Fig : Fracture Site Reduced and Fixed with Semi Tubular Plate

Fig 1 : Exposure of Fracture Site

Fig 2 : Fixation with C.C. Screw

Fig. 1:- Ccscrewfixationtomedialmalleolus.

Fig 6 : Fixation of Semi Tubular Plate with 3.5 mm Cortical Screw

Fig 7 : Semitubular Plate Closed with Soft Tissue

Fig 8 : Skin Closure

Discussion:-

Ankle fractures constitute 10% of all fractures, therefore being among most prevalent lower limb fractures; open fractures account for only 2%[13]. The most prevalent causes include twisting injuries, automobile accidents, sports injuries, and falls from heights[14]. The primary cause of injury in this study was traffic accidents (53.33%), which were followed by falls from height (13.33%) and twisting injuries or self-falls (33.33%). To lower the frequency of ankle fractures, the results presented emphasize the significance of preventive measures such as road safety awareness and safety gear for sports fans[15].

Regarding fracture patterns, bimalleolar fractures (60%) were the most common type, followed by unimalleolar fractures (33.33%) and trimalleolar fractures (6.66%). Based on Lauge-Hansen classification, pronation-abduction injuries have been the least prevalent (6.66%) while supination-external rotation injuries have been most prevalent (60%)[4]. Results align with prior research that demonstrated rotational injuries, especially supination-external rotation, are the most prevalent cause of ankle fractures.

Treatment strategies differed based on soft tissue abnormalities and fracture stability. Although immobilization as non-surgical treatment for stable fractures is still an option, its side effects—such as joint stiffness, cartilage degradation, and muscle atrophy—highlight the necessity of cautious patient selection and follow-up[16]. High-energy injuries or cases with impaired soft tissue have been treated in phases, initially with external fixation and afterwards withinternal fixation [3]. The best course of action for unstable fractures is still surgery, that provides early mobilization and anatomical reduction[17]. However, difficulties which include implant failure and wound infection were observed, highlighting the significance of careful surgical technique and postoperative care[18].

Following the Olerud-Molander ankle score, 60% of patients had outstanding functional outcomes, 20% had good outcomes, 13.33% had fair outcomes, and 6.66% had bad outcomes[19]. The large proportion of good and exceptional results indicates that, when appropriate, surgical intervention produces positive functional outcomes. However, the existence of both favourable and unfavourable results emphasizes the necessity of customized treatment planning, rehabilitation, and patient education to maximize healing and prevent chronic issues such as post-traumatic arthritis[20].

Summary:

This study tracked thirty cases of malleolar fractures that were surgically treated using different methods. With 53.33% of patients injured, automobile accidents have been the most prevalent cause of injury.The most frequent injury type, accounting for 60% of all cases, was supination-external rotation (Lauge-Hansen's classification). Malleolar screws and tension band wiring were used to secure the medial malleolus, whereas a semi-tubular plate and tension band wiring were used to repair the lateral malleolus. Two patients experienced postoperative skin infections as a consequence. 24 cases(80%) had excellent to good results at end of research, while 2 cases(6.66%) had poor results and 4 cases(13.33%) had fair results.

Conclusion:-

The most prevalent type of malleolar fracture that is also most frequently associated with complications and dislocations is a supination-external rotation injury. There were not many issues with the Pronation-External rotation form.A favourable functional outcome is impacted by early surgical fixation with the right implants, articular congruity restoration, and perfect anatomical reduction. An excellent functional outcome was attained by giving the ankle joint enough stability and mobility again. A comprehension of damage mechanism is required for internal fixation and successful reduction. When employing one-third tubular plate for securing lateral malleolus, lateral malleolar bend should be replicated. For lateral ankle stability, fibula's length must be maintained. In all intraarticular fractures, anatomical reduction is crucial, especially when ankle or similar weight-bearing joint is impacted. A significant degree of reduction is ensured via internal fixing and open reduction. Results for about 90% of patients were satisfactory. The outcome is less satisfactory the more severe the injury. It is best to prevent malleolar non-union due to soft tissue interposition. The majority of issues were mild and went away in two weeks. Tension band wiring is recommended for osteoporotic bones and tiny fracture fragments.

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