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Address of Correspondence

Dr. Mohammad Shakil
Mobile:01612711572, Phone:0818-0121
e-mail: amccjournal@gmail.com

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Dengue: An Emerging Public Health Threat in Bangladesh

Hossain MM

Bangladesh is plagued by the dengue virus, which greatly increases morbidity and mortality here. There are four different serotypes of dengue virus: DENV-1, DENV-2, DENV-3 and DENV-4, which differ antigenically from one another, are the cause of dengue fever, an infectious disease that is transmitted through the bite of an infected *Aedes* mosquito. After several years of DENV-1 and DENV-2 detections predominating, DENV-3 and DENV-4 are now being identified more regularly in 2023. Dengue fever is characterized by a quick start of fever and at least one of the following signs or symptoms: rash, easy bruising, nose or gum bleeding, severe headache, acute pain behind the eyes, muscle and joint discomfort. Symptoms can develop up to 10 days after exposure, however they commonly start to show 5-7 days after being bitten. Dengue hemorrhagic fever (DHF), a more serious form of the disease, can develop. If DHF is not identified and treated promptly, it could be fatal.

The fastest-spreading infectious disease transmitted by mosquitoes, dengue has become a global public health issue.¹ Dengue is one of the top 10 worldwide health risks, according to the World Health Organisation.²

According to the Directorate General of Health Services (DGHS), a division of the Ministry of Health and Family Welfare (MoHFW) of Bangladesh, data collected from 1st January 2023 to 31st December 2023, there have been total 1,703 dengue-related deaths, including 979 in the Dhaka city. Among the hospitalized dengue cases in that period total 109,973 were within Dhaka City and 211,100 were outside the city. The DGHS statistics demonstrated that outside the capital, dengue hospitalizations and mortality both increase significantly. In the month of September and October there were the highest number of dengue cases and deaths. Dengue death in 2023 has crossed total death numbers during last 23 years since 2000.³

In Bangladesh, dengue disease spreads quickly during the monsoon season. The incidence of dengue cases normally increases in April, peaks in July, and then declines quickly after August. October 2022 had the highest monthly dengue case counted (21,932 cases). In November and December 2022 the monthly fatality counted 113 and 281 respectively.⁴ Due to COVID-19 pandemic-related lockdown measures, the country experienced a relatively lower number of dengue cases which was 28,429 in 2021

and 1,405 in 2020.⁵ A study done in Bangladesh by Ahsan A et al. in 2019 found that the highest number of dengue cases reported in 2019 was 101,354.⁶

Dengue is more common in low- and middle-income countries (LMICs), which are also more likely to have larger population densities, inadequate healthcare systems, rapid unplanned urbanization, and changing climatic conditions as a result of global warming.⁷ In Bangladesh, there has been a rise in the number of mosquitoes as a result of high temperatures, high humidity, and an unusually high incidence of episodic rainfall. This has led to a greater prevalence of dengue.⁸

Dhaka North City Corporation began a special month-long program on 7th July 2023, to eradicate mosquitoes in an effort to stop the city's mosquito-borne disease epidemic. It was running campaigns to raise awareness, fining people who violate hygiene rules, fogging, and using more larvicide. Bangladesh Red Crescent Society (BDRCS) volunteers are also working with the Dhaka North City Corporation. They are currently working in Wards 27, 35 and 36. Forty volunteers are working per day to cover an entire ward. The activities include: Distribution of awareness raising leaflets, public announcements, supporting the City Corporation's public announcement and awareness raising activities, supporting the North City Corporation's campaign to spray mosquito repellents.⁹

Following COVID-19, dengue may causes serious threat to national economies across the nation. Increasing public awareness is essential to decrease the risk of incidence of this devastating illness. Controlling the vector, raising public awareness and immunization will be the major contribution in preventing dengue.

Dr. Mohammad Monir Hossain

Assistant Professor, Department of Anatomy
Army Medical College Cumilla.

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Outcomes of Fracture Shaft of The Femur in Children Treated by Titaneum Elastic Nails(TENs)

Islam MS¹, Karim MR², Rahim ZZ³, Hossain S M E⁴

Abstract

Background: Femoral shaft fractures are most common fractures of the lower extremity among the children. It is the most common pediatric orthopedic injury that requires hospitalization. The presence of a growing proximal and distal physes imposes a real challenge in management of these fractures. Titanium elastic nailing (TEN) has become the standard treatment for fractures of shaft of femur in children for reasons including mini-invasive surgery, no need for casting, early mobilization and discharge as well as cost-effectiveness. **Objectives:** To evaluate the outcomes of fracture shaft of the femur in children fixed by Titanium elastic nailing (TEN). **Materials and Methods:** This prospective observational study was conducted from Jan 2019 to Jan 2020 in the Department of orthopedic and trauma Surgery of CMH Dhaka. Total 15 children of 6 to 12 years of age were included in this study. The fractures shaft of femur was fixed closely by TEN and follow-up was done post operatively for a mean duration of 6 months. The outcomes were evaluated by following Flynn's criteria. **Results:** The mean age was 9 years of which 10 were males and 5 were females. RTA was the most common cause of injury, consisting of 10 (66.66%) cases. According to types of fractures oblique, comminuted and transverse fractures were observed in 10(66.66%), 3(20%) and 2(13.33%) of patients respectively. We got excellent outcome in 66.7% cases, satisfactory results in 20% and poor results in 13.4% cases. **Conclusion:** TEN is the method of choice for the femoral shaft fractures in children because it considerably decreased the period of immobilization and ensured early return to normal life. It also allows early ambulation and shorter hospital stay and higher parent satisfaction. It also provides flexural, translational and rotational stability as well. It provides better outcome in simple transverse, short oblique mid diaphyseal femoral fractures.

Keywords: Femur, Children, Injury, Intramedullary, Titaneum Elastic Nails (TENs).

Introduction

Trauma is the leading cause of morbidity and mortality in children. In children fractures, femoral fractures have significant impact on the patients, families and their regional trauma resources. In children younger than 6 years fall from height during play and motor vehicle accidents is the commonest cause of femoral fractures.¹ Fractures of the femur are the most incapacitating fractures in children. Femoral shaft fractures represent around 2.2% of all bony injuries in children with peak at 6 and 16 years. Low velocity trauma leads to transverse fractures and high-

speed causes comminuted or segmental fractures.^{2,3} Fractures are more common in rural children than in children of cities because of frequent playing and climbing on trees.⁴ The treatment options are age related, depends on the type of injury, associated injuries, and the location and kind of fracture. The aim of treatment is anatomical realignment, along with restoration of muscle and joint movement as close as possible to the normal. Recovery is accelerated by the early movement, which encourages healing of fracture, preservation tone of the muscle and restoration of the activities of the joints.⁵ The management

1. *Lt Col Mohammad Saiful Islam, Classified Specialist in Orthopaedics, CMH, Dhaka
2. Brig Gen Mohammad Rezaul Karim, Adviser Specialist & Head Department of Orthopaedics, CMH, Dhaka
3. Lt Col Zamil Zaidur Rahim, Classified Specialist in Orthopaedics, CMH, Dhaka
4. Maj S M Eqbal Hossain, Classified Specialist in Orthopaedics, CMH, Dhaka.

***Address of Correspondence:** Lt Col Mohammad Saiful Islam, Classified Specialist in Orthopaedics, CMH, Dhaka.
E-mail:saiful101057@gmail.com

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of paediatric femoral shaft fractures gradually has evolved towards a more operative approach in the past decade. For children aged between 5 and 16 years, there are wide varieties of surgical and nonsurgical treatment options available with no clear consensus as to the preferred treatment. More recently, there has been a growing trend towards surgical treatment with widening of the indications to include isolated femoral fractures. The methods have included external fixation, compression plating and intramedullary nailing with either rigid or flexible nails.⁶ TEN is a recent technique which allows stable reduction, maintenance of reduction and early mobilization.⁷ At present, all tibial, femoral, radial, ulnar, and humeral shaft fractures in the child age group can be fixed with TEN. The TEN fixation is commonly done between five and fifteen years of age, but in a few selected cases, a good result is obtainable even between the ages of two and five years.⁸ According to the recent guidelines produced by the German Society of Pediatric Surgery, femoral fractures can be treated by TEN in children over three years of age.⁹ TEN has become a good choice of stabilization in pediatric femoral shaft fractures. The established advantages of this technique include early union, early mobilization, early weight bearing, easy implant removal, small incision, scar acceptance, high patient satisfaction rate and no risk to growth plate or blood supply of femoral head. Good results at mid-term follow-up have been reported in children older than six years of age.^{10,11} Because of rapid healing and spontaneous correction of angulations most of femoral shaft fractures in children younger than six years of age can be treated conservatively. Above six years of age all such fractures when treated non-operatively could have loss of reduction, malunion, intolerance and complication associated with plaster. Near the end of skeletal maturity accurate reduction is necessary as angular deformity is no longer correctable by growth. In skeletally mature adolescents, use of an antegrade solid locked intramedullary nail has become the standard of treatment.¹² TEN of long bone fractures in the skeletally immature have gained widespread popularity because of its clinical effectiveness and low risk of complications. Many studies have supported the use of this technique in the femur.¹³ Treatment like skeletal traction and application of cast in diaphyseal femoral fractures in children and young adolescent commonly result in malunion or joint stiffness, limb length discrepancy, delay in functional recovery, psychological, social, educational, economic difficulties. An ideal device would be a single load shearing implant allowing mobilization and maintaining the alignment until bridging callus form without risking the physis or blood

supply to femoral head. TEN fulfills that qualities in children aged 6-12 years.¹⁴ Aims and objectives of our prospective study was to evaluate the short term outcome and complications of titanium elastic nails for the treatment of stable and unstable pediatric femoral fractures in the 6-16 years age group.

Materials and Methods

This prospective observational study was conducted from Jan 2019 to Jan 2020 in the Department of orthopedic and trauma Surgery of CMH Dhaka. Children 6-12 years of age with simple femoral-shaft fractures participated in the study consecutively. Inclusion criterias were Winquist type-1 fractures, less oblique & transverse fractures having closed or Gustillo type-1 open injury. Exclusion criterias were more than one fractures of same sided lower limb, polytrauma, subtrochanteric & distal femoral fractures, Winquist type 2 and type 3 fractures, open fractures of Gustillo type-2 and above, any pathological fractures, any congenital musculoskeletal disorders or dysplasia, local skin infection, those unfit for anaesthesia and patients unwilling for surgery.^{15,16} A total of fifteen samples were included in this study. All the cases had undergone operative treatment within 3 to 7 days of their injury. Routine pre-operative work up was done for all patients. Informed written consent for operation was obtained as per hospital policy. Preoperative preparation was done as per standard protocol which included classification of fracture according to Winquist & Gustillo type and calculating the diameter of the medullary canal at the isthmus of the femur to measure probable diameter of the titanium elastic nail. This was gained by using the formula, diameter of Nail in mm x 0.4, i.e 40% of medullary canal diameter.¹⁷ All aseptic precautions were taken in the operating room. Operations were performed on fracture table and C-arm was used to guide fracture alignment and nail entry. Two titanium elastic nails were used for a single fracture. The nails were pre-bent accordingly before introduction. Introduction of nail was done in distal to proximal direction. Closed reduction of the fracture was tried before incision. Incision at the skin of about 2 cm was made over inner and outer aspect of distal thigh at the level of the proximal pole of the patella. By the help of a 4.5 mm bone Awl or Steinman pin entry was made about 2-3 cm proximal to the epiphyseal plate at an oblique direction into the medullary canal. Titanium elastic nails of proper size was introduced and gently pushed along the fracture site and twisted properly to engage in the upper femoral shaft in a opposite fashion. About 2-3 cm of the nail was left outside the insertion point and cut to allow for subsequent removal. Cut end of the nail were not bent and

allowed to remain flush with the femur to prevent skin irritation. At the end of operation further stabilization was done by applying a long leg back slab. Static quadriceps exercises were begun from third post operative day. All patients were fit for discharge when both patient and parents are well oriented with physiotherapy. Patients were allowed to do wall pushing exercises to prevent distraction at fracture site. Patients were asked for first follow up after 6 (Six)

weeks and advised for partial weight bearing if the X- ray showed satisfactory callus formation in at least 3 (three) cortices in both A/P & Lateral views. Full weight bearing was allowed after 8 weeks. Further follow up was done at 12 weeks & 24 weeks post-operatively. In follow up check-up patients were examined for functional outcome by Flynn's criteria (Table I) and were searched for complications like malunion, delayed union, knee stiffness, pain at nail entry site and any sign of infection.¹⁷

Table I: Flynn's criteria

Variables	Excellent	Satisfactory	Poor
Length discrepancy	<1 cm	<2 cm	>2 cm
Malalignment	5 degrees	(5-10) degrees	>10 degrees
Pain	No	No	Yes
Complications	None	Minor & solved	Major and/or residual morbidity.

Results

Table II: Distribution of types and modes of injury (n=15)

Parameter	Type	Frequency	Percentage (%)
Mode of Injury	Fall from height	3	20.0
	Fall of weight	2	13.3
	Road traffic accidents.	10	66.7
Type of Injury	Comminuted	3	20.0
	Oblique	10	66.7
	Transverse	2	13.3

Table III: Peri-operative details for different fracture patterns (n=15)

Type of Injury	Frequency (n)	Day of Surgery (day) mean±sd	Nail diameter (mm) mean±sd	Duration of surgery (minutes) mean±sd	Duration of hospital stay (days) mean±sd
Comminuted	3	4.1±1.09	3.80±0.27	75.1±8.22	11.2±1.10
Short oblique	10	4.3±0.57	3.9 ±0.35	80.3±18.52	10.64±1.33
Transverse	2	4.0 ±0.73	3.6±0.35	80.0±16.63	10.42±1.30
Total	15	4.5±0.7	3.6±0.3	80.4±16.6	10.6±1.3



Figure I: Functional outcomes based on the Flynn scoring system (n=15)

Table IV: Fracture union in weeks (n=15)

Fracture union in weeks	Frequency	Percentage (%)
Less than 12 weeks	8	53.33
12 - 17 weeks	5	33.33
More than 18 weeks	2	13.33
Total	15	100

Table V: Complications seen in children operated for shaft of femur fractures (n=15)

Complication	Frequency	Percentage (%)
Knee Stiffness	2	18.18
Infection	3	27.27
Mal Union	2	18.18
Knee pain	4	36.36
Total	11	100

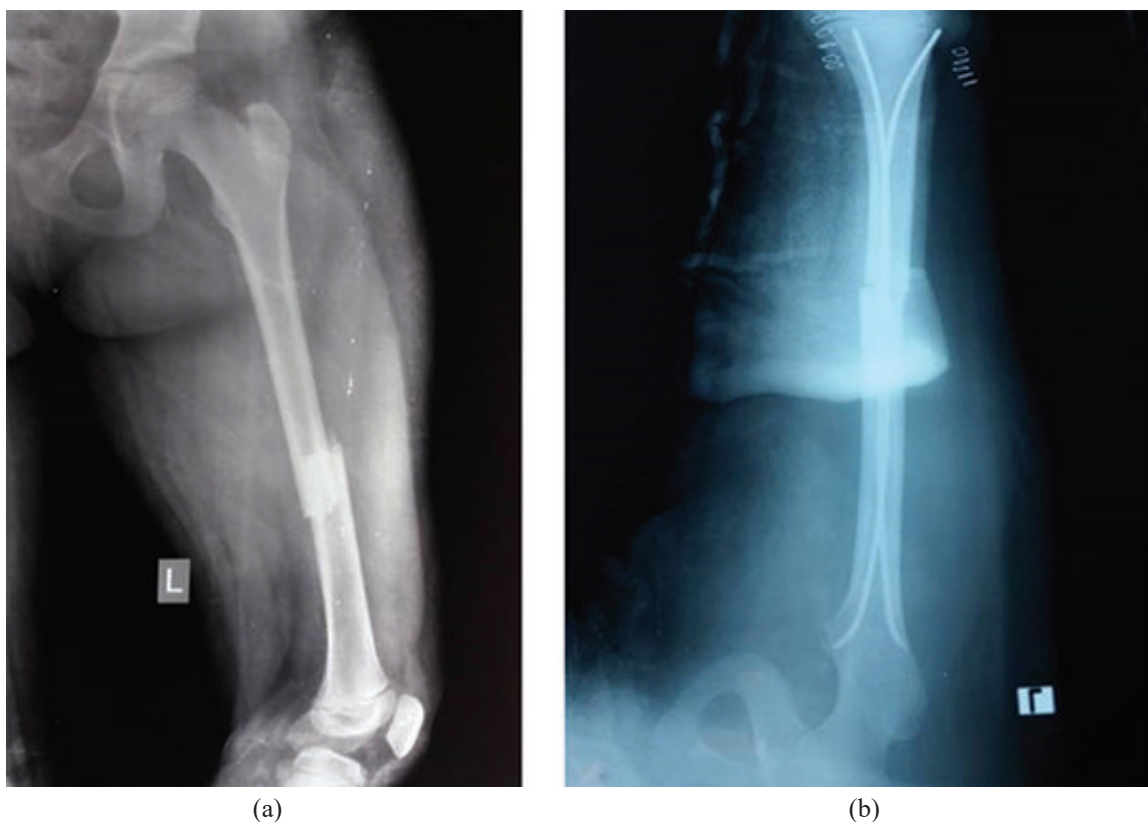


Figure II: a) Pre-operative X-ray shows fracture shaft (left femur) of 12 yrs old children, (b) Post operative X-ray shows satisfactory fixation of fracture shaft (left femur) of the same children.

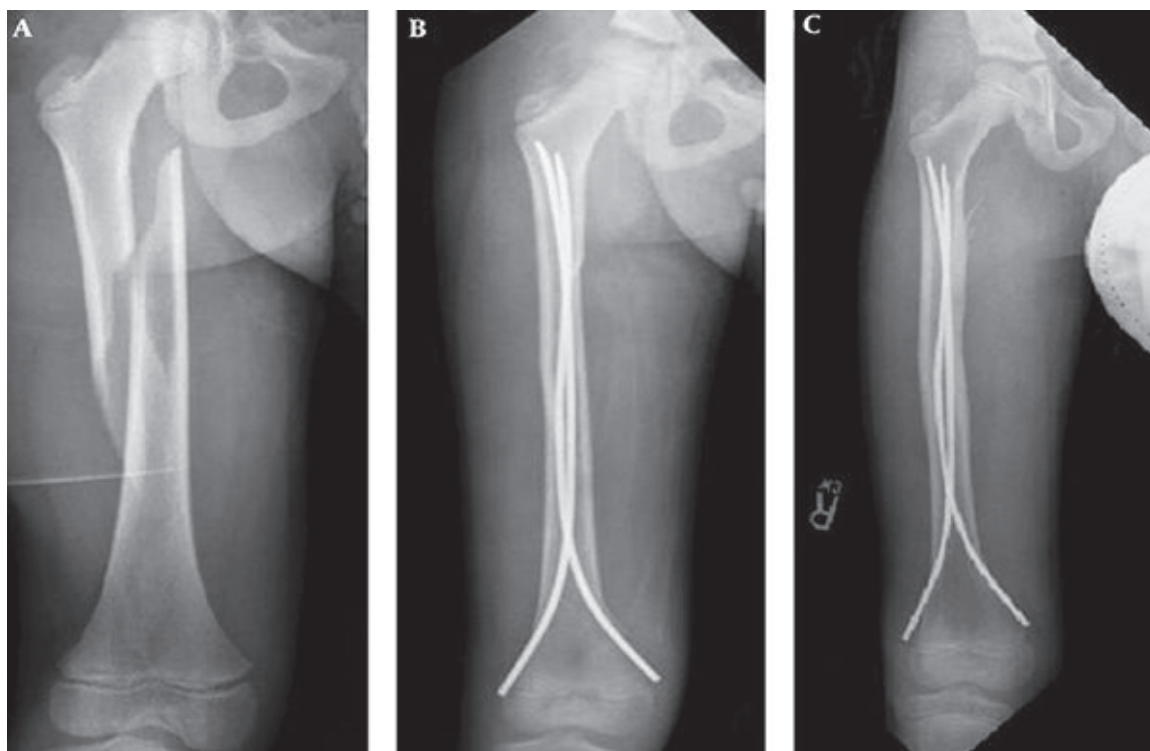


Figure III: (a) Pre-operative X-ray of fracture shaft (left femur) of 6 yrs old children (b) and (c) Satisfactory fixation of fracture shaft (left femur) of the same children 6 month later.

Discussion

Orthopedic surgeons have tried various methods to treat pediatric femur fractures to avoid prolonged immobilization, loss of fracture reduction, malalignment, limb length discrepancy, psychological complications, loss of school days, and better nursing care.¹⁸ Though it is reported that pediatric femoral shaft fractures are common in males with approximately 2.5:1 male to female ratio. However, in the present study, boys were 10(66.7%) and girls 5 (33.34%). The mean age of children was 9 years. In our study, RTA was the most common cause of injury, consisting of 10 (66.66%) of cases, whereas fall from height was noted in 3(20%) of cases and fall of weight 2(13.33%). According to types of fractures oblique, comminuted and Transverse fractures were observed in 10(66.66%), 3(20%) and 2(13.33%) of patients, respectively. In a study, Acharya D et al. in Nepal found transverse, oblique, spiral and comminuted fractures which were observed in 38.29%, 34.04%, 19.14 %, and 8.5% of patients respectively.¹⁹ Kumar S et al. found out of 30 cases 12 had spiral fracture, 5 had oblique fractures, 7 had transverse and 6 had comminuted fractures.²⁰ In our study, 10(66.66%) of patients had excellent, 3(20%) had satisfactory, and 2(13.33%) had poor outcomes with TEN as per Flynn's et al. criteria. A study done by Talukder TK et al. in Bogura, Bangladesh found 86% had excellent result and 14% had satisfactory using Flynn et al. scoring criteria.²¹ Das SP et al. found in their study that 75% had excellent outcomes while 20% had satisfactory outcomes.²² But Kayaokay k et al. found only 12 (40%) of the patient's results were excellent, 14 (46.7%) were good, and four were poor.²³ Sinha SK et al. found excellent outcome in 75.5% of cases, satisfactory outcome in 17% and poor outcome in 7.5% of cases.²⁴ In our study, the union time was less than 12 weeks in 8(53.33%), 12 - 17 weeks in 5(33.33%) and more than 18 weeks in 2(13.33%) cases. Venkataraman S et al. found the average union time in group one was 11.4 weeks and in group two was 14.41 weeks.²⁵ In the present study 4(36.36%) patients had developed knee pain, 3 (27.27%) of infection, 2 (18.18%) of knee stiffness and mal union. In a study Vishwanath C et al. found no major complications and there were 5 cases of malunion and 8 cases of superficial infections.²⁶ Flynn JM et al. found in a study that there were 2 (4.4%) of malunion, 4 (8.8%) of delayed union, 3 (6.6%) of limb shortening, 2 (4.4%) of limb lengthening, 6 (13.6%) of nail prominence and skin irritation, 2(4.4%) of superficial infection at nail entry and one case of re-fracture.¹⁷ Another study done by Vishwanath C et al. and Narayanan UG et al. found in their study that entry site irritation and pain is

the most commonly complication of TENS.^{26,27} Vishwanath C et al. found in his study that superficial infection was seen in 04(8%) cases in their study which was controlled by antibiotics & regular dressings on alternate days within a week.²⁶

Conclusion

Titanium elastic nailing is the method of choice for the femoral shaft fractures in children because it considerably decreased the period of immobilization, ensured early return to normal life. It also allows early ambulation and shorter hospital stay and higher parent satisfaction. It also provides flexural, translational and rotational stability as well. It provides better outcome in simple transverse, short oblique mid diaphyseal femoral fractures.

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A Study of Laparoscopic Repair of Paraumbilical Hernia

Dutta AK¹, Quadir EU², Islam S³, Johny MA⁴

Abstract

Background: Paraumbilical hernia is one of the most common surgical problems and usually occurs as a result of weakness in musculo-fascial layer of anterior abdominal wall. Now a days mesh repair is the standard method for treatment of paraumbilical hernia. For advancing technology laparoscopic mesh repair is the treatment of choice for paraumbilical hernia management. The aim of this study is to evaluate the outcome of laparoscopic mesh repair of paraumbilical hernia. **Materials and Methods:** This is a prospective clinical study which included 15 patients of paraumbilical hernia who underwent laparoscopic mesh hernia repair from January 2018 to December 2019 in Combined Military Hospital, Jashore and followed up for 1 to 4 years. All patients were studied regarding operative time, postoperative pain, postoperative hospital stay, surgical site infection like wound infection, seroma formation and recurrence. **Results:** Out of 15 patients male were 06 (40%) and female were 09 (60%). Mean age of patients was 40 years with range being 20-60 years. Among these 09 (60%) female patients, 07 (77.78%) were multiparous and 02 (22.22%) were non-multiparous. Mean operative time in this study was 90 minutes (Range:60 to 120 minutes). Mean postoperative hospital stay was 3.5 days. There was no wound infection but 1 (6.67%) patient developed seroma. There was 0.00% recurrence in present study. **Conclusion:** The laparoscopic mesh repair is a safe, effective and acceptable method for repair of paraumbilical hernia and it is also very effective in recurrent cases. **Key words:** Paraumbilical hernia, Laparoscopic paraumbilical hernia repair.

Introduction

Para-Umbilical Hernia (PUH) is one of the most common surgical problems with rise in the repair rate annually.¹ Previously PUHs were repaired by tension-free suture technique. Due to a high unacceptable recurrence rate this procedure lost popularity.² A real change in view of PUH repair came with the introduction of mesh hernioplasty.³ Now a days meshplasty is the most commonly performed procedure for PUH. An increased incidence of wound infection and wound related complications in open mesh repair lead to continuing research into the optimal method of treatment of PUH which lead the surgeons to adopt laparoscopic approach. Conventionally, smaller PUH (<3 cm) has been repaired by open suture technique such as MAYO repair and its modifications but with a high recurrence rate of more than 60%.⁴ The open repair using

prosthetic mesh usually require adequate subcutaneous dissection, raising of flaps and drain insertion with increased incidence of wound complications such as infection. The recent introduction of laparoscopic repair of ventral hernias is gaining popularity and is being practiced by many surgeons all over the world.⁵ There is increasing evidence that laparoscopic repair of PUH is superior to open mesh repair regarding operative and postoperative complications, postoperative pain and overall morbidity and mortality.⁶

Materials and Methods

This is a prospective study which was conducted in Combined Military Hospital, Jashore included 15 (09 female and 06 male) consecutive patients over a period of January 2018 to December 2019 presenting with history

1. *Lt Col Ashim Kumar Dutta, Classified Specialist in Surgery, CMH Cumilla.
2. Col Md Ershad Ul Quadir, Classified Spl in Surgery, CMH Cumilla.
3. Col. Md Saiful Islam, Classified Spl in Orthopedics, CMH Cumilla,
4. Dr. Md Mahbulul Alam Johny, Assistant Registrar, Department of Surgery, Army Medical College, Cumilla.

*Address of correspondence: Lt Col Ashim Kumar Dutta, Classified Specialist in Surgery, CMH Cumilla, Cumilla Cantonment. Cell No: 01712248899. E mail: asimdr29@gmail.com

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of swelling and occasional pain around the umbilicus. Age between 20 to 60 years of either gender, fit for general anesthesia and who were interested laparoscopic hernia repair included for this study. Patient not fit for general anaesthesia, patients of <20 and >60 years of age, pregnant females and patients not willing for laparoscopic hernia repair were excluded. The diagnosis was made by history, clinical examination and ultrasound examination in selected cases of paraumbilical hernia. All patients were evaluated for systemic disease or precipitating cause. Patient was admitted to surgical ward one day prior to operation. The procedure was explained to the patient and written and informed consent was taken. Routine preoperative investigations and pre-anesthetic checkup were done in outdoor basis. Ultrasound of whole abdomen was done in every patient preoperatively. A fleet enema was given at night the day before surgery and patient kept nothing by mouth for 8 hours prior to surgery. Patient took bath with antiseptic soap both evening before and on day of surgery. The operative procedure was performed under general anesthesia, patient was given prophylactic antibiotic (Ceftriaxone 1gm Intravenously). An alternative puncture site was chosen away from the primary hernia defect and any abdominal incision. A skin incision was made and a veress needle was inserted at palmer's point. The abdomen was insufflated with CO₂ and a 10 mm port was made, through which laparoscope telescope was introduced. First diagnostic laparoscopy was done. Under direct vision, additional 10 mm trocars were inserted as far lateral as possible and 5 mm trocars on the opposite side laterally. Direct vision and palpation allowed identification of the edges of the hernia defect. Adhesiolysis was performed utilizing an Endo-Babcock to provide exposure and counter traction of hernia contents and adhesions, which were lysed with endoscopic shears by sharp and blunt dissection. Liga-sure was used in case of dense adhesions. All the hernia sac contents were reduced into peritoneal cavity. The hernia sac was left in situ. The edges were then drawn on the abdominal wall, and polypropylene mesh was measured to overlap the defect by at least 2.5 cm in all direction and cut to the appropriate size. Sutures were placed and tied at all four corners and were left approximately 6 inch long. Mesh was rolled and introduced into the abdominal cavity through 10 mm port. In the abdominal cavity mesh was unrolled and 4 corners of the mesh was tied with help of suture passer. The whole margin was fixed with parietal layer with the help of endoscopic tracker. In this study mean operative time was 90 minutes (Range: 60 to 120 minutes). Most of the operative time was around 90

minutes but among them 03 (three) patients had dense adhesion which prolonged the operative time up to 120 minutes. Postoperatively, the patients were kept NPO for 24 hours and then started oral feedings. At first Injection Ceftriaxone was given for 2 days then oral Cefixime was started and continued for 7 days. Dressing was assessed and changed if it was soaked. Postoperatively, every patient was kept under observations for 3-4 days in ward and observed for any complications. The patients were discharged on 3rd or 4th POD if there had no complications. Patients were discharged and advised to come in followed up at 1 month, 3 months and 6 months interval. Approval was obtained from the institutional ethical committee. All data were analyzed using the SPSS-26.

Results

A total of 15 patients of paraumbilical hernia who underwent Laparoscopic hernia repair from January 2018 to December 2019 were selected. Following parameters were observed and analyzed. In this study there had some predisposing factors, one of them was obesity where 03 (20%) patients had normal BMI, 07 (46.67%) patients were overweight, 05 (33.33%) patients were obese. From 09 female patients; 07 (77.78%) were multiparous and 02 (22.22%) were non-multiparous. Another factor was heavy weights lifting which was not a real factor where 09 (60%) had usual work, and 06 (40%) had strenuous work (Table II). In this study most of the patient had swelling around umbilicus, which reduced on lying down, with occasional abdominal pain which was aggravated by constipation and persistent cough.

Table I: Gender distribution

Gender	No of patients(n=15)	Percentage (%)
Male	06	40.00
Female	09	60.00

Table I shows that in this study 60% (9) of patients were female and 40% (6) patients were male.

Table II: Distributions of predisposing factors

Variable		Frequency	Percentage (%)
Age	20 – 40 years	10	66.67
	41 – 50 years	03	20.00
	51 – 60 years	02	13.33
Parity	Multipara	07	77.78
	Non - Multipara	02	22.22
BMI	Normal	03	20.00
	Overweight	07	46.67
	Obese	05	33.33
Occupation	Hard work	06	40.00
	Non hard work	09	60.00

Table II shows that in this study mean age of patient was 40 years with a range being 20-60 years. The incidence of paraumbilical hernia was more common in female patient. From 09 female patients; 07 (77.78%) were multiparous and 02 (22.22%) were non-multiparous. Some predisposing factors, like obesity where 03 (20%) patients had normal BMI, 07 (46.67%) patients were overweight, 05 (33.33%) patients were obese. Heavy weights lifting which was not a real factor where 09 (60%) had usual work, and 06 (40%) had strenuous work.

Table III: Mean operative time, post-operative hospital stays and infection and recurrence

Present study	n=15
Mean operative time	90 minutes
Mean post-operative hospital stay	3.5 days
Wound infection	0.0%
Seroma formation	6.67%
Recurrence	0.0%

Table III shows that in this study after laparoscopic paraumbilical hernia repair patients had less postoperative pain in comparison to open paraumbilical hernia repair, as assessed by visual analogue scale at postoperative day 1 to 3 and postoperative month 1, 3 and 6. No patient developed chronic pain after surgery. In this study mean hospital stay was 3.5 days (3-4 days), there was no wound infection but one (6.67%) patient developed seroma who was treated conservatively.

Discussion

A paraumbilical hernia is a protrusion of a viscous or part of it through a weak point of the linea alba superiorly or inferiorly on the umbilicus. Paraumbilical hernia most commonly present with swelling around the umbilicus with occasional abdominal pain. Over all PUH accounts for 10%-14% of all hernias.⁷ Risk factors for PUH are female sex, obesity, multiparity and cirrhosis.⁸ Paraumbilical hernias are more common in women than men.⁹ In this study, female patients were also more affected (60%). Diagnosis of PUH is mainly clinical. Some patients present with intestinal obstruction when bowel gets trapped in sac causing adhesions and irreducibility. In such cases imaging modalities like ultrasonography and abdomen radiography are helpful in knowing the contents of sac and severity of obstruction. Surgery is the treatment of choice. In case of small defects (< 2 cm in diameter) primary anatomical repair can be

done but in large defects (≥ 3 cm in diameter) simple anatomical repair is associated with high recurrence rates. With the advent of mesh repair there was a drastic decline in recurrence rate. In open method after the sac is excised, the free edges of rectus are approximated and the mesh is placed outside rectus sheath and fixed to it. It usually requires subcutaneous dissection, raising of flaps and drain insertion with increased incidence of postoperative complications such as seroma and infection. But in laparoscopic mesh repair of paraumbilical hernia, mesh is placed intraperitoneally. So, no need of subcutaneous dissection, raising of flaps and drain insertion which reduce the postoperative complication like seroma and infection.¹⁰ Seroma at postoperative day 4, was present in 1 patient that was 6.67% in present study compare to Ujiki et al, Lau et al was 13% and 7.6% respectively.^{11,12} Similarly, Tunio et al. observed increase in the recurrence rate after suture repair compared with open mesh repair. The analgesic requirement and hospital stay were lower in the mesh repair group.¹³ Compared to open repair, laparoscopic repair is technically feasible, safe and effective with good clinical outcome. It is associated with relatively longer intraoperative time but reduced postoperative pain, analgesic requirement, complications and infection rates with less hospital stay and early return to normal activities.¹⁴ Laparoscopic repair is expected to decrease the early postoperative complications and hospital stay. In open mesh hernioplasty incision is larger which increased the risk of postoperative infection of around 15% to 45%.¹⁵ But in laparoscopic mesh repair contact between mesh and skin is very minimal leading to less chance of mesh infection and also postoperative complication. In laparoscopic hernioplasty there is no scar. So, it is more cosmetically acceptable than open repair.

Limitation

Limitations of study were less sample size and not taking cost effectiveness into consideration.

Conclusion

Laparoscopic repair of paraumbilical hernia is safe, effective and acceptable procedure now a days. Laparoscopic repair is much better than open repair due to less postoperative morbidity like postoperative pain, wound infection and recurrence. With increasing experiences and development of new meshes and fixation devices, it is now the gold standard procedure for management of paraumbilical hernia.

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Cysts, Benign Tumours and Tumour like Lesions of Oral Cavity and Jaws with their Treatment Modalities: Assessment of 60 Cases

Sarker MAG¹, Mannan MA²

Abstract

Background: Oral cavity and jaw bones are common sites of development of various types of cysts and benign growths. These may be categorized broadly into two groups odontogenic, those are associated with remnants of tooth forming tissues and non odontogenic. **Materials and methods:** A descriptive observational study was carried out to assess the distribution and incidence of cysts, benign tumours and tumour like lesions of oral cavity and jaw bones including their treatment modalities and outcome during the period of 01 January 2019 to September 2022 at Military Dental Centre (MDC) Cumilla and at Mainamati Cantonment General Hospital, Cumilla Bangladesh. Purposive sampling technique was used to include the patients in this study. **Results:** A total of 60 patients were evaluated and treated. Ratios of male female patients were 1.5:1. Radicular cyst 30(77%) was the most common pathology found in jaw bone followed by ameloblastoma 05(13%). In case of soft tissue lesion mucocele cases 11(52%) were highest in number. Maxilla was affected more 27(69%) than mandible incase of intra bony pathology and lower lip was the most common anatomical site for soft tissue growth 11(52%). Among treatment modalities it was seen that decompression followed by enucleation was very much effective treatment modality for cystic ameloblastoma. **Conclusion:** As oral cavity is involved in vital functions of eating, speaking and moreover facial appearance has great significance in everyone's life so any pathology occurring in oral cavity should be taken seriously and proper treatment is required. This study will enrich many clinicians with useful information regarding diseases of oral cavity and jaw bones.

Keywords: Cyst, Benign tumour, Oral cavity, Jaw

Introduction

Oral cavity and jaw bones are common site of development of various types of cysts and benign growths. Those may be categorized broadly into two groups odontogenic, those associated with remnants of tooth forming tissues and nonodontogenic. Odontogenic tumors (OT) are lesions derived from epithelial, ectomesenchymal or mesenchymal elements of the tooth forming apparatus. It constitutes of a heterogeneous group of lesions with diverse histopathological features and clinical manifestations and the spectrum of the

biological behavior of these lesions ranges from hamartomatous or non-neoplastic tissue proliferations to malignant neoplasms.² Non-odontogenic tumors arising from the ectoderm involved in facial tissue develop from epithelium of nonodontogenic origin and mainly include palatal cyst of the newborn, nasolabial cyst, nasopalatine duct cyst, median palatine cyst, thyroglossal duct cyst, teratoid cyst, epidermoid and dermoid cysts, orallymphoepithelial cyst, and surgical ciliated cyst.^{3,4} Non-odontogenic tumors of the jaw are rare pathologies that can often be overlooked, resulting

1. Lt Col Md Ataul Gani Sarker, Classified specialist in Oral and Maxillofacial Surgery, Military Dental Centre Dhaka

2. Lt Col Md Abdul Mannan, Graded specialist in Oral and Maxillofacial Surgery, Military Dental Centre Cumilla.

Address of Correspondence: Lt Col Md Ataul Gani Sarker, OMF Surgeon, Military Dental Centre, Dhaka, E-Mail: ataul_den@yahoo.com
Mob: 01721665947

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in delayed diagnosis and treatment.⁵ A cyst is a pathological epithelial cell-lined cavity that is filled with fluid or soft material. They are frequently found as intra-bony lesions of the jaw, which can expand so drastically that sometimes the facial appearance can change.¹ Ameloblastoma is a benign, locally aggressive, slow-growing neoplasm of the jaw, which arises from odontogenic epithelium and accounts for 1% of all oral tumors. They are more frequently located in the mandible (80%), especially in the angle and ascending ramus.⁶⁻⁸ The young age at occurrence, unilocular radiographic appearance, macroscopic cystic appearance and most importantly, the better response to conservative treatment, make it a distinguishable entity.⁹ Many treatment techniques for ameloblastoma have been suggested, which include decompression, enucleation, marginal resection and aggressive resection as partial or total resection.¹⁰ Oral mucocele is the most common benign minor salivary gland lesion, caused by mechanical trauma to the excretory duct of the gland. Clinically, they are characterized by single or multiple, soft, fluctuant nodules, ranging from the normal color of the oral mucosa to deep blue. Fibroblasts and connective tissue are prone to proliferation and respond to mechanical irritation with reactive lesions or fibroma development. Reactive lesions of the oral cavity are non-neoplastic proliferations with very similar clinical appearance to benign neoplastic proliferation, which are produced in association with chronic local irritation or trauma. They include peripheral giant cell granuloma, pyogenic granuloma, granuloma fissuratum, irritation fibroma.¹¹ The diseases that affect the oral mucosa are diverse and comprise a broad spectrum of either benign or malignant lesions. Poor oral hygiene, removable dentures, smoking, malposition, harmful habits and mechanical irritation predispose to reactive lesions and tumour development.¹¹ Enlargement of the jaws and facial region causes considerable disfigurement, affects eating, swallowing and speaking, as well as causing pain.¹² The aim of this study was to assess the incidence of Cysts, Benign Tumours and Tumour like Lesions of Oral Cavity and Jaws bones and also to evaluate their clinical outcome and treatment modalities. This would help in improvement of clinical care and also enrich the academic and research field in case of above mentioned conditions of oral cavity and jaw bones.

Materials and methods

The present descriptive observational study was carried out in Military Dental Centre Cumilla and in Mainamati Cantonment General Hospital, Cumilla, Bangladesh from 01 January 2019 to September 2022. Patients diagnosed with cysts, benign tumour and tumour like lesion of oral cavity and jaw bones were included in this study. Diagnosis was done by naked eye clinical examination, orthopantomograph (OPG) X-ray, computed tomography (CT) scan and by histopathologic examination. The accumulated data were studied and analyzed to evaluate the gender distribution, types of diseases, anatomical site of distribution of the diseases, modalities of treatment rendered and their clinical outcome.

Results

A three years and eight months descriptive observational study evaluated and treated 60 patients, who had cysts, benign tumour and tumour like lesion in oral cavity and jaw bones, from January 2019 to September 2022 in department of oral and maxillofacial surgery at Military Dental Centre, Cumilla and at Mainamati Cantonment General Hospital, Cumilla. Out of 60 patients male were 67% (40) and female were 33% (20). Among all the lesions 65% (39) were in jaw bones and 35% (21) were in oral mucosa and on gingival tissue. Radicular cyst was the most common intra bony lesion 77% (30) and mucocele was the most common soft tissue growth 52% (11).

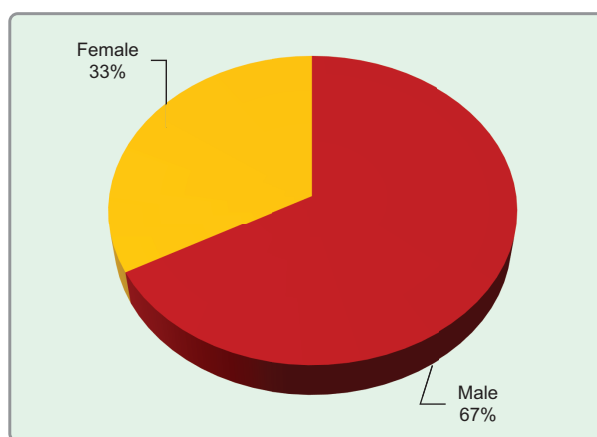


Figure 1: Gender distribution of the patients.

Figure 1 shows 67% (40) patients were male and 33% (20) patients were female.

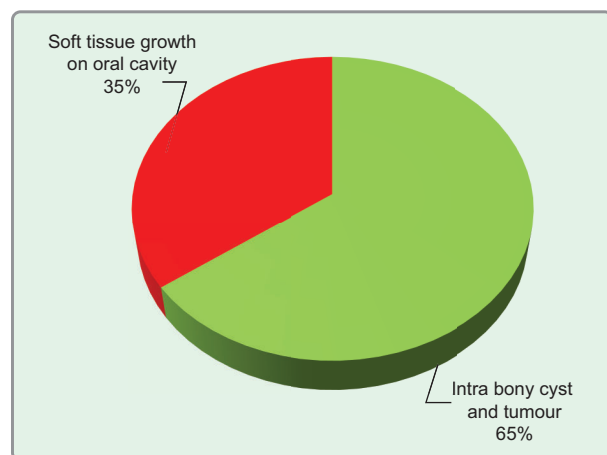


Figure II: Incidence of the lesion according to their site of origin.

Figure II shows that 65% (39) lesions were intra bony and 35% (21) lesions were soft tissue growth.

Table I: Distribution of intra bony cysts and tumours of jaw bone (n=39)

Parameters	Frequency (n)	Percentage (%)
Radicular cyst	30	77
Ameloblastoma	05	13
Odontoma	02	5
Dentigerous cyst	02	5
Total	39	100

Table I reveals that out of 39 intra bony lesions 77% (30) cases were radicular cyst and 13% (05) cases were ameloblastoma.

Table IV: Distribution of anatomical location of soft tissue growth in oral cavity (n=21)

Lesion Type	Lip n (%)	Buccal Mucosa n (%)	Alveolar Mucosa n (%)	Hard Palate n (%)	Floor of the Mouth n (%)
Mucocele	11(52.4%)	-	-	-	-
Fibroma	-	4(19.1%)	-	-	-
Ranula	-	-	-	-	2(9.5%)
Peripheral Giant Cell Granuloma	-	-	2(9.5%)	-	-
Squamous Papilloma	-	-	-	2(9.5%)	-

Table IV shows that among the soft tissue lesions lip was the most commonly involved site 52% (11) followed by buccal mucosa 19% (04).

Table II: Incidence of soft tissue growth on oral cavity (n=21)

Parameters	Frequency (n)	Percentage (%)
Mucocele	11	52
Fibroma	4	18
Ranula	2	10
Peripheral giant cell granuloma	2	10
Squamous papilloma	2	10
Total	21	100

Table II shows that out of 21 soft tissue growth 52% (11) were mucocele and 18% (04) cases were fibroma.

Table III: Distribution of anatomical location of intra bony cyst and tumors of jaw bone (n=39)

Lesion Type	Maxilla n (%)	Mandible n (%)
Radicular Cyst	25(64.1%)	5(12.8%)
Ameloblastoma	-	5(12.8%)
Odontoma	2(5.1%)	-
Dentigerous Cyst	-	2(5.1%)

Table III shows that in case of intra bony lesions maxilla was mostly involved 69% (27) and mandible was affected in 31% (12) cases.

Table V: Incidence of cysts, benign tumours and tumour like lesions of oral cavity and jaw bone (n=60)

Parameters	Frequency (n)	Percent (%)
Radicular cyst	30	50
Mucocele	11	19
Ameloblastoma	05	09
Fibroma	04	07
Odontoma	02	03
Dentigerous cyst	02	03
Ranula	02	03
Peripheral giant cell granuloma	02	03
Squamous papilloma	02	03
Total	60	100

Table V shows that radicular cyst was the most common benign pathology of oral cavity 50% (30) followed by mucocele 19% (11) and ameloblastoma 09% (05).

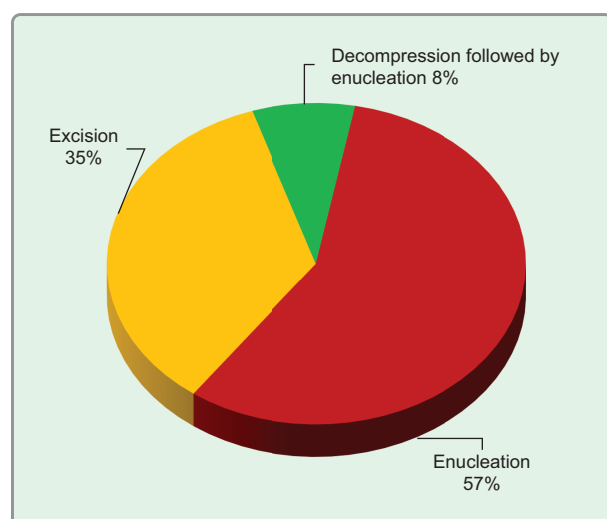
**Figure III:** Modalities of treatment rendered for intra bony cysts, tumours and soft tissue growths of oral cavity

Figure III shows that 57% (34) cases were enucleated, 35% (21) cases were excised and for 8% (05) cases decompression and enucleation was performed.

Discussion

Epidemiologic studies are known as the basis for health policy making. Geographic distribution of diseases and the influence of ethnic, nutritional, cultural habits and genetic patterns have great importance in occurrence and prevalence of a particular disease. For instance, a disease which is prevalent in a particular community may be seen rarely in another community. Therefore, studying the epidemiological profile of various diseases is important to identify the etiology and risk factors of the most common diseases to establish new prevention and treatment protocols, making regulatory decisions, rules and policies for health planning

and to effectively allocate resources.¹³ According to our study most of the patients were male 67% (40) and female were 33% (20) ratio of male female patients were 1.5:1. Kilinc A et al. in their study found that among seven hundred and nine benign tumor and tumor like lesions of the oral cavity and jaws the male : female ratio was 1:1.4.¹⁴ In our study 65% (39) cases were found as intra bony lesions and 35% (21) were soft tissue lesion. The most common intrabony jaw lesions were radicular cyst 77 % (30) followed by ameloblastoma 13%(05). A study by Peker E et al. found that radicular cysts (n = 440; 29.9%) were the most common biopsied jaw lesion, followed by periapical granuloma (n=337; 22.9%) and dentigerous cysts (n = 247; 16.8%).¹⁵ Radicular cyst arises from chronic irritation of dental pulp following dental caries or trauma to teeth as most of the patient of our country remain ignorant regarding dental care hence this high number of radicular cysts were found. A study by Varkhede A et al. found that ameloblastoma to be the most frequent odontogenic tumor, accounting for 40.83% (49) followed by keratocystic odontogenic tumour (KCOT) 37.5% (45) odontome 11.66 % (14) ,(AOT) adenomatoid odontogenic tumour 5.8% (07), the rest of the tumors are negligible.¹⁶ Another study by Jing W et al. found that ameloblastoma 40.3% (661) was the most common type of odontogenic tumour followed by KCOT 35.8% (588) and odontoma 4.7% (78).¹⁷ In our study among the soft tissue growth in oral cavity it is found that mucocele cases were most commonly seen about 52 % (11) followed by fibroma 18 % (04) ranula, peripheral giant cell granuloma and squamous papilloma cases were 10 % (02) each. A study by Blochowiak K et al. found that fibroma was the most frequent pathomorphological diagnosis, followed by mucocele and reactive lesions such as irritation fibroma (IF) and different forms of granuloma.¹¹ A study by Kilinc A et al. in their study found that in soft tissue related lesions peripheral giant cell granulomas (PGCGs) were the most frequent lesions 37.4% (210) followed by epulis fissuratum 18.5% ((109) and pyogenic granulomas 8.5% (50).¹⁴ According to our study among 39 cases of intrabony cysts and tumors, radicular cyst was the most prevalent lesion accounting for 64.1% (25) in the maxilla and 12.8% (05) in the mandible. A study by Varkhede A et al. found that mandible was affected in 88 cases (73.33%) and maxilla in 32 cases (26.67%).The mandible was clearly the more common site of occurrence for most odontogenic tumors. The posterior region of the mandible was the frequent site of involvement.¹⁶ For the soft tissue growth in the oral cavity among 21 cases, mucocele was the most common, affecting 52.4% (11) of cases, mainly in the lower lip. Fibroma was observed in 19.1% (04) of cases, primarily in the buccal mucosa. Ranula, peripheral giant cell granuloma and

squamous papilloma had relatively lower incidences, with ranula and peripheral giant cell granuloma each accounting for 9.5% (02) and squamous papilloma for 9.5%(02), but only affecting the floor of the mouth, alveolar mucosa and hard palate, respectively. A study by Blochowiak Ket al. found that the lower lip was the most common site involved followed by buccal mucosa and vestibular mucosa. It was also particularly predisposed for the mucocele development.¹¹ Another study by Kilinc A et al. stated that fibroma is most often encountered in adults and is primarily located on the gingiva, lips, and buccal mucosa. Other common sites are the borders of the tongue.¹⁴ If we consider overall benign pathological condition of oral cavity and jaw bone, it was revealed that radicular cyst was mostly found 50 % (30) of all the cases followed by mucocele 19% (11) and ameloblastoma 9% (05). In case of treatment modality concern, enucleation was mostly performed procedure 57%(34) followed by excision of soft tissue growth 35% (21), decompression followed by enucleation was done in case of 08% (05) ameloblastoma cases. Meshram M et al. in their study stated that marsupialization followed later by enucleation was adopted as treatment of choice for an extensive unicystic ameloblastoma in mandible involving body, ramus and condyle. Among the pediatric and adolescent population, the conservative line of treatment plays an excellent role as it is associated with a faster bone fill and efficient restoration of normal bony architecture.⁹

Conclusion

Oral cavity and jaw bones are very important anatomical places where various types of cysts, benign tumours and tumour like lesions can develop. This study provides important epidemiological and clinicopathologic information regarding most commonly occurring lesions in oral cavity and jaw bones. As oral cavity is involved in vital functions of eating, speaking and moreover facial appearance has great significance in everyone's life so any pathology occurring in oral cavity should be taken seriously and proper treatment is required. Radicular cyst which is very common can be prevented if any carious or traumatic tooth is endodontically treated in due time. Decompression with enucleation and curettage in the treatment of cystic ameloblastoma is very much effective. This procedure may mitigate many unwanted complications of resection of jaw bone following treatment of ameloblastoma. Further study can be done in this subject to find out many more unidentified facts.

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Evaluation of Heat Exhaustion Related Acute Kidney Injury among Military Persons

Rashid HO¹, Ferdous J², Saha R³, Khan FN⁴

Abstract

Background: Heat related illness (HRI) in military environment is mostly due to strenuous physical activity with or without high ambient temperature. HRI is a physical hazard and a potential health risk which can result in various conditions ranging from heat cramps, heat syncope, heat exhaustion, heat stroke and even death in extreme cases. The aim of this study was to evaluate heat exhaustion related acute kidney injury (AKI) among military persons. **Materials and methods:** This cross-sectional retrospective study was done among AKI diagnosed 138 admitted cases due to heat exhaustion after strenuous exercise in the combined military hospital in Sylhet Cantonment from January 2021 to December 2022. Data was collected from record file review. The data were then analyzed using SPSS version 26. **Results:** A total of 138 admitted patients of AKI were finally included. All of AKI cases were after heat exhaustion following strenuous exercise. The leading cause of AKI was dehydration. Most of cases presented with altered level of consciousness and electrolyte imbalance. The patient mortality rate was zero. Three months following discharge from hospital 99% of AKI cases had completely resolved, 1% of AKI cases had progressed to chronic kidney disease. Most of the patients hospital staying was less than 7 days.

Conclusions: This study provides evidence that most of the AKI related admission cases were associated with heat exhaustion following strenuous exercise. It also evidence heat exhaustion related AKI had good outcome.

Keywords: Acute kidney injury, Chronic kidney disease, Heat exhaustion

Introduction

AKI is defined as a sudden decline in kidney function demonstrated by either a rise in serum creatinine of at least 50% over baseline levels occurring within a 7-day time period, or a sudden decrease in urine output.¹ Heat related illness may cause life-threatening injury that can lead to primary brain injury, secondary multiple organ dysfunction syndrome (MODS), including AKI, is a major cause of death and disability in heat exhaustion patients.^{2,3} It is a complex condition with diffuse etiologies resulting in both higher hospitalization and long-term mortality.⁴ The mechanisms of which are poorly understood. The long-term consequence of AKI are not well understood, but there are some potential concerns of an increased subsequent risk of chronic kidney disease (CKD). More

therapeutic options to improve renal recovery after AKI are required. In 2017, Hodgson et al. conducted a systematic review of the literature observing AKI following events, with a focus on serum creatinine (Cr).⁵ They reported that increases in serum Cr concentrations were seen following endurance events, but the long-term implications were unknown.⁶ Serum Cr, the principal biomarker used to clinically diagnose AKI, is a muscle breakdown product filtered by the kidneys and excreted in urine, meaning a rise, in many settings, indicates impaired kidney function. AKI represents 10-15% of hospitalizations worldwide, and AKI prevalence in the intensive care unit may exceed 50%.⁷ Not only is AKI a risk factor for CKD and end stage renal disease but people who survive an episode are at an increased risk of

1. Col (Prof.) Harun-Or-Rashid, Classified Specialist in Medicine, Combined Military Hospital, Cumilla, Bangladesh
2. Lt Col (Assoc Prof.) Jannatul Ferdous, Classified Specialist in Paediatrics, Combined Military Hospital, Cumilla, Bangladesh
3. Dr. Rahul Saha, Assistant Registrar, Dept. of Medicine, Army Medical College Cumilla
4. Dr. Farah Naj Khan, Assistant Registrar, Dept. of Medicine, Army Medical College Cumilla

Address of Correspondence: Col (Prof.) Harun-Or-Rashid, Classified Specialist in Medicine, Combined Military Hospital, Cumilla, Bangladesh. Email: imharunr@gmail.com, Mobile-01819167268

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developing non-renal conditions including congestive heart failure and cardiovascular disease.⁸ Low and middle-income countries bear the greatest burden. Early recognition of AKI enables timely management and improvement of renal function, and therefore reduces the risk of long-term morbidity and mortality.

Materials and methods

This cross-sectional retrospective study was done among 138 AKI diagnosed admitted patients due to heat exhaustion after strenuous exercise in the combined military hospital in Sylhet Cantonment from January 2021

to December 2022. Data was collected using a self-administered semi-structured questionnaire from the record file. The inclusion criteria were male military person, aged 18 -40 years, AKI caused by heat exhaustion after strenuous exercise during hot weather. Exclusion criteria were patients with chronic kidney disease, IHD and HF, LF, age below 18 years and above 40 years. Staging of AKI was done by KDIGO criteria (Table I).⁹ Collected data were analyzed by using MS word and Excel.

Ethical approval

Verbal permission was taken from the concerned department and concerned authority of Sylhet CMH.

Table I: KDIGO criteria for AKI

	S Creatinine	Urine output
Stage 1	Increase in S Creatinine >27 micromol/dl (48 hours) or 1.5 to 1.9 multiplied by baseline (in 7 days)	<0.5 ml/kg/hour for 6-12 hour
Stage 2	2.0 to 2.9 multiplied by baseline S Creatinine	<0.5 ml/kg/hour for >12 hour
Stage 3	3.0 or more multiplied by baseline or increase in S Creatinine >354 micromol/l or beginning of renal replacement therapy or eGFR <35ml/min/1.73m ²	<0.3 ml/kg/hour for > 24 hour Or anuric for >12 hour

Results

Table II: Distribution of age group (n=138)

Age (years)	Frequency (n)	Percentage (%)
<20	6	4.35
20-29	116	84.06
30-39	16	11.59
Total	138	100

Table III: Staging of AKI patients (n=138)

Stage of AKI	Frequency (n)	Percentage (%)
Stage 1	101	73.19
Stage 2	30	21.74
Stage 3	7	5.07
Total	138	100

Table IV: AKI patients clinical presentations (n=138)

Clinical presentations	Frequency (n)	Percentage (%)
Dehydration	138	100
Nervous system dysfunction	120	86.95
Shock	78	56.52

Table V: Biochemical abnormalities (n=138)

Biochemical abnormalities	Frequency (n)	Percentage (%)
Hypernatremia	24	17.39
Hyponatremia	112	81.15
Hyperkalemia	42	30.43
Hypokalemia	132	95.6
Hypercalcemia	12	8.69
Hypocalcemia	84	60.86
Increased creatinine level	26	18.84
Hyperuricemia	20	14.49
Decreased level of chloride	18	13.04

Table VI: Supportive management given to AKI patients (n=138)

Supportive management	Frequency (n)	Percentage (%)
Oxygen support	120	86.95
Intravenous fluid	138	100
Blood component transfusion	20	14.49
Antibiotics	80	57.97
Inotropic support	60	43.47
Diuretic	30	21.73
Vasoactive drugs	28	20.28

Table VII: Distribution of AKI patients by hospital stay (n=138)

Length of hospital stay	Frequency (n)	Percentage (%)
<7 days	100	72.46
>7 days	38	27.54
Total	138	100

Table VIII: Distribution of AKI patients by recovery (n=138)

Length of hospital stay	Frequency (n)	Percentage (%)
Completely Recovery	136	98.55
Developed complications	2	1.45
Total	138	100

Discussion

In this study, we evaluated the acute kidney injury with heat exhaustion during hot weather. The majority of AKI hospital admission patients were 20-29 age groups. This study specifically focuses on kidney injury caused by strenuous exercise in hot weather and the subsequent risk of AKI, similar study was done by Schlader et al. which focused on kidney injury in military personnel.⁸ Regarding staging of admitted AKI patients, most 101(73.19%) of them were in stage I. In similar study Xue JL et al. also found stage I AKI patients were predominant.¹⁰ In case of clinical presentations of this study all admitted AKI patients 138(100%) presented with dehydration, then followed by nervous system dysfunction 120(86.95%) and shock 78(56.52%). We found various biochemical and electrolyte abnormalities in this study like hypokalemia 132(95.6%), hyponatremia 112(81.15%), hypocalcemia 84(60.86%), hyperkalemia 42(30.43%), increased creatinine level 26(18.84%), hypernatremia 24(17.39%), hyperuricemia 20(14.49%), decreased level of chloride 18(13.04%), hypercalcemia 12(8.69%). Tucker LE et al. also found hyponatremia, hypokalemia, hypocalcemia and

hypophosphatemia.¹¹ A cohort study done by Satirapoj et al. among exertional heat stroke patients also found the common electrolyte disturbances such as hypokalemia (71.2%), hypophosphatemia (59.1%), hyponatremia (53.0%), hypocalcemia (51.5%), and hypomagnesemia (34.9%).¹² Shimizu Y et al. found high level (>6.4 mg/dL) of serum uric acid after anaerobic exercise.¹³ In case of management patients got oxygen support 138(100%), intravenous fluid 120(86.95%), blood component transfusion 20(14.49%), antibiotics 80(57.97%), isotropic support 60(43.47%), diuretic 30(21.73%), vasoactive drugs 28(20.28%) respectively. In case of length of hospital stay, 100 (72.46%) stayed in hospital less than 7 days and 38(27.54%) more than 7 days. Regarding recovery of the patients, most of them 136(98.55%) recover completely and about 2 (1.45%) cases progressed to chronic kidney disease requiring permanent medications.

Limitations of the present study

This study is limited by its retrospective nature, relatively small size and single center-based study.

Conclusion

This is the first study in our country on AKI due to heat exertion related illness in a peripheral hospital, CMH Sylhet, Bangladesh. Severe heat related illness like heat exhaustion can cause profound AKI. Serum electrolyte imbalance occurred frequently in patients with heat exhaustion. It is now possible to identify patients at an early stage of AKI after heat exhaustion and render immediate effective therapeutic measures that can prevent CKD reducing morbidity and mortality.

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Outcome of Capitellum Fracture Treated With Open Reduction and Internal Fixation with Herbert Screw

Das RK¹, Khan MSH², Islam MS³, Hoque MJ⁴, Banik JC⁵

Abstract

Background: Distal humerus fractures that include the capitellum and the trochlea are rare injuries and constitute approximately 6% of all distal humeral fractures and 1% of elbow fractures. These fractures should be treated by the principals of an intra-articular fracture treatment. Proper reduction, stable fixation, and early mobilization of the fracture are crucial in achieving good functional results. The aim of this study is to present the results of 10 patients with capitellum fractures treated with open reduction and fixation with Herbert screw. **Materials and Methods:** This is a descriptive type of observational study. Ten Patients (07 males, 03 females) who were admitted to our Zainul Haque Sikder Women's Medical College & Hospital, Dhaka between June 2017 and June 2020 with the diagnosis of capitellum fracture and followed-up for a mean period of 36 months were included in this cross-sectional study. A double arc sign in the lateral views of the X-rays of the elbow was seen in all the cases. Under tourniquet, using extended lateral approach, open reduction and internal fixation (ORIF) was done using Herbert screw, under vision from posterior to anterior direction from the posterior aspect of lateral condyle of humerus avoiding articular penetration. **Results:** All the fractures united uneventfully. At the end of one year follow-up the mean range of motion was 105° (range, 70° to 140°) during flexion- extension and 150° (range, 130° to 170°) during supination-pronation. According to the Mayo Elbow Performance score, six patients were evaluated as excellent, two patients as good, one patients as fair, and one as poor. **Conclusion:** If capitellum fracture are treated with good operative technique and implant, the outcome of the treatment will be good.

Keywords: Capitellum Fracture, ORIF, Herbert Screw

Introduction

Coronal shear fractures involving the capitellum represent substantial partial articular injuries that may occur in isolation, extend medially to involve the trochlea, or occur in association with complex ipsilateral periarticular elbow trauma that includes osseous or ligamentous injuries extending beyond the lateral column. There are several fracture classifications and surgical exposure and hardware selection are based on the fracture pattern and the extent of articular involvement.¹⁻² As the complex nature of capitellar fractures has become better appreciated, treatment options have evolved from closed reduction and/or immobilization and fragment excision to a preference for open reduction and internal fixation to achieve a stable

anatomic reduction in order to allow the initiation of early motion.³⁻⁶ Extensile surgical exposures and Herbert cannulated variable-pitch screws are used to address more complex fracture patterns, which maybe more common than previously thought.⁷⁻⁸ These injuries are characterized by metaphyseal comminution and ipsilateral radial head fracture, and they often require supplemental fixation.⁹⁻¹¹ Studies on the outcomes of open reduction and internal fixation of capitellar fractures and associated injuries to the trochlea, radial head, and the lateral collateral ligamentous complex are limited, but they have demonstrated satisfactory functional results in the majority of patients when the injury is limited to the radiocapitellar compartment. We have utilized a uniform surgical

1. *Dr. Ripon Kumar Das, Associate Professor (CC), Department of Orthopedics, Army Medical College, Cumilla.
2. Lt. Col. Mohammad Shahnewaz Hossain Khan, Classified Orthopedic Surgeon, Combined Military Hospital, Cumilla Cantonment.
3. Col Mohammad Saiful Islam, Classified Orthopedic Surgeon, Combined Military Hospital, Cumilla Cantonment.
4. Dr. Md Johurul Hoque, Associate Professor, Department of Orthopedics, ZH Sikder Women's Medical College & Hospital, Dhaka.
5. Dr. Jhuton Chandra Banik, Resident Surgeon, Department of Orthopedics, Dhaka Medical College & Hospital.

*Address of Correspondence: Dr. Ripon Kumar Das, Assistant Professor, Department of Orthopedics, Army Medical College, Cumilla. Mobile no: 01717230280

Address of Correspondence:

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approach for capitellar trochlear fractures consisting of an extensile lateral exposure, articular fixation with buried cannulated variable-pitch Herbert compression screws, and simultaneous repair of associated osseous injuries.¹²⁻¹⁴

Materials and Methods

This study included 10 patients from June 2017 to June 2020 after taking written consent from patients at our hospital after obtaining approval from ethical committee. Patient was evaluated at pre-operative time, then at 1 month follow up, at 3 months follow up, at 6 months follow up and finally 12th months follow up. True AP and lateral view are taken at the time of admission. CT scan was not done due to poor economic condition of patient. All patients are given with long arm back slab both pre and post operatively. All cases were operated upon under regional anaesthesia. The injured elbow was assessed clinically for ligamentous stability. A sterile tourniquet was used in all cases. The elbow was handled through an extensile lateral approach. A skin incision was centred over the lateral epicondyle extending from the anterior aspect of the lateral column of the distal end of the humerus to approximately 2 cm distal to the radial head. Following dissection through the subcutaneous tissue layers, the lateral column was palpated. The forearm was pronated to move the radial nerve away from the surgical field. A flap was raised by elevating the common extensor origin along with the anterior capsule and connected to the Kocher interval distally. This resulted in a continuous full-thickness anterior soft tissue flap. The fracture site was debrided of haematoma and soft-tissue debris to allow visualisation of the fracture fragments. Saline irrigation was used to achieve greater clarity. In patients with a lateral epicondylar fracture fragment; the epicondylar fragment with the lateral collateral ligamentous complex origin was reflected distally to enhance exposure. Fracture fragments were reduced and provisionally fixed with K-wires. The terminally threaded Herbert screws, directed posterior to anterior were used to fix the fracture. The distal thread was buried beneath the articular surface. With an exception of very small fragments, we used two screws to fix the fracture. In cases of non-union, augmentation with bone graft from the ipsilateral olecranon was done. Supplemental fixation with mini fragment screws or Kirschner wires was used to reconstruct more complex fracture patterns with lateral metaphyseal comminution and/or trochlear extension. The radial wrist extensors were repaired to the soft-tissue cuff on the lateral supracondylar ridge, and the Kocher interval was closed in continuity with the proximal exposure of the lateral column. The

remainder of the wound was closed in layers. Postoperatively, the elbow was immobilised in a splint for four to six days following which range of motion exercises were initiated under supervision. Patients were follow up at regular intervals and clinico radiological evaluation was done. The condition of bone union, evidence of avascular necrosis on radiographs, wound healing problems or other complications, if any, were recorded. Stability, pain, and range of motion of the elbow joint were evaluated according to the Mayo elbow performance score.



Figure I: Lateral and AP view of left elbow showing type IV capitellum fracture

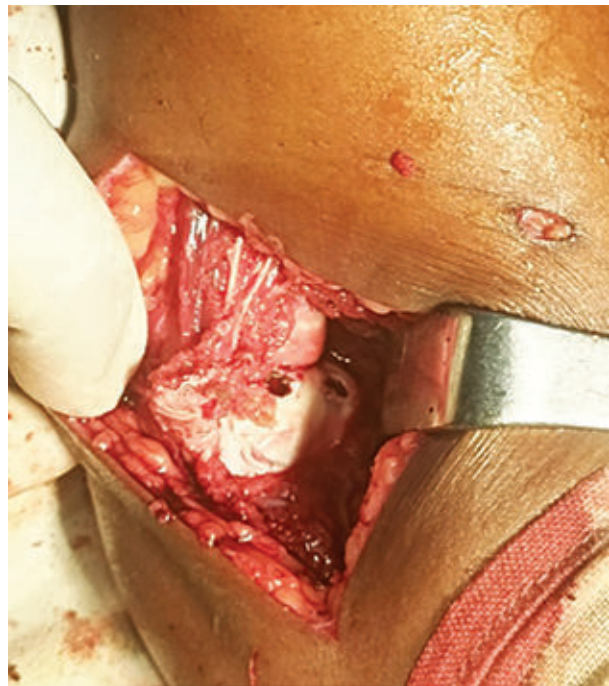


Figure II: Per operative fixation of capitellum by Herbert Screws



Figure III: Post operative: X-ray showing (right elbow) capitellum fracture fixed with two Herbert Screws

Results

Among ten patients 07 were males and 03 were females. Mean age 30 years, ranges from 17-35 years. The right side was involved in seven cases and left was three cases. The dominant limb was involved in all cases. All cases are classified as Bryan and Morrey Type IV. The mean operative time was 12 hours (range 8–20 hours). Peroperatively, in one case, capitellum fragments were found free and devoid of soft tissue attachments. These were replaced, fixed and showed good union in due course. No intraoperative or postoperative complication was encountered. At the end of one year follow-up the mean range of motion was 105° (range, 70° to 140°) during flexion-extension and 150° (range, 130° to 170°) during supination-pronation. All patients had good stability, and none had residual pain. Overall, results were found to be excellent. Follow-up at 1 month, follow up at 3 month, follow up at 6 month and finally 12th month follow up were carried out. All patients were satisfied with the operative outcome and returned to their previous levels of activity. All fractures healed well. One evidence of avascular necrosis of the fragments was noted and no incidence of osteoarthritis has been noticed so far.

Table I: Age incidence (n=10)

Age Group (Years)	Number of patients	Percentage (%)
18-24	05	50
24-35	05	50

Table II: Sex distribution (n=10)

Sex	Number of Patients	Percentage (%)
Male	07	70
Female	03	30

Table III: Range of motion after operation (n=10)

Type of Fracture	Range of motion during flexion-extension	Range of during motion supination-pronation
Type IV	70° to 140°	130° to 170°

Table IV: Patient's satisfaction with the outcome of the procedure (n=10)

Level of Satisfaction	No. of patients	Percentage (%)
Highly satisfied	07	70
Moderately satisfied	02	20
Not satisfied at all	01	10

Discussion

Proper visualization of the capitellar fragment is sometimes not possible in the routine views of the elbow and a radial head-capitellum view may help in better delineation of the fracture personality.⁹ Properly positioned lateral view is essential for diagnosis, with the fracture easily missed if the projection is slightly oblique as per Fowles and Kassab.¹⁰ A comparative view of the opposite elbow or CT scan will help in diagnosis. A properly taken lateral view usually shows anterior and superior migration of the capitellar fragment. Characteristic finding in the lateral X-ray is the “double-arc sign” because of the sub-chondral bone of the capitellum and lateral part of trochlea. The sub-chondral bone of the trochlea creates the double arc and when this sign is present it signifies that a part of the trochlea is also involved. Radiological diagnosis is difficult in a child because the capitellum is not fully ossified and fused before the age of 9-10 years.¹¹ Other authors have suggested an oblique radiograph to detect this injury.¹¹ In case of difficulty, in interpreting the radiographs, an arthrogram may be done.¹² Fractures are often missed in the emergency room setting as the outline of the distal end of the humerus is intact. One case was missed in this series in the emergency room. A CT scan delineates the fracture extent more clearly and helps the surgeon plan the approach, since, if the fragment is displaced on the medial side, another medial approach may be needed for reduction. Treatment of type 2 and 3 capitellum fractures can be either conservative or excision of the fragments.¹³ Ochner reported, in 1996, successful outcome of closed reduction of coronal fractures of the capitellum in nine cases with long term follow-up.¹² In none of our cases closed reduction was attempted even before open reduction. Closed reduction of the fracture can lead to early arthritis, loss of motion of the elbow or instability of

the elbow as it is usually a non anatomical reduction.¹⁴ Excision of the fragment can lead to instability of the elbow. Excision to prevent avascular necrosis is suggested by Sano S et al.¹⁵ Fragment excision due to fear of avascular necrosis or redisplacement can lead to radio-humeral osteoarthritis and instability of the elbow. Alvarez advocated excision of the fragment in 10 out of 14 cases. Sano advocates olecranon osteotomy approach for proper visualization of the trochlea, but in the present series by retracting the medial structures with a bone lever the entire medial aspect of the trochlea could be visualized.¹⁵ Moreover, purchase of screw threads in the subchondral bone is more in PA directed screws, and splintering of the subchondral bone due to countersinking is less. Lateral collateral ligament has to be preserved during the procedure. Various internal fixation methods have been described, including K wires, 4 mm cancellous screws, Herbert screws and absorbable polyglycide pins.^{11,14} There are also reports of plate fixation of the fracture. Kirschner wires do not provide enough stability for mobilization before fracture healing and also damage the articular cartilage.¹³ The better functional outcome of operative fixation has been documented. We used Herbert screw and get excellent results.

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Corresponding author

As principal investigator Dr

had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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