



# Outcome of En Bloc Resection of Osteoidosteoma

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## ABSTRACT

**Background:** Osteoid osteoma benign tumor is unusual before the age of 5 or after age 30 and is more prevalent in men. The main symptom is pain, which is typically severe and responsible for nocturnal awakenings. The conditions usually diagnosed through radiological imaging and confirmed by Histopathology.

**Objectives:** To assess the effectiveness and the complications that had been risen during the surgical procedure of osteoid osteoma using en bloc resection.

**Methods:** (10) Patients diagnosed with osteoid osteoma were treated with en bloc surgical resection were included in this study. The study took place at Al Yarmouk teaching hospital. The study was from April 2017-October 2018 and included 10 patients. (7) male, (3) females. The mean age of the sample was  $18 \pm 4$  years. Descriptive and inferential statistical analysis was used to fulfill the study objectives.

**Results:** There was significant decrease in their median pain scores after 8 weeks of treatment (t test,  $P < 0.05$ ). Total pain resolution and cessation of analgesics were achieved in 9 of 10 patients after 8 weeks post-operatively. P value was set at 0.05 or less. SPSS software version 20 was used for data entry and statistical calculations.

**Conclusions:** En bloc resection of osteoidosteoma is very safe and effective procedure with a very low complications rates.

**Key words:** EnBloc, OsteoidOsteoma, benign tumor.

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## INTRODUCTION

Osteoid osteoma is a benign neoplasm of the bone that was first described by Bergstrand in 1930 and then by Jaffe in 1953<sup>(1)</sup>. Osteoid osteoma is unusual before the age of 5 years & rarely occur after the age of 30 years and is more prevalent in men. It usually buds in the appendicular skeleton or spine and is generally localized within or adjacent to the cortical bone. The most frequent localizations of osteoid osteoma are the diaphysis or metaphysis of long bones<sup>(1)</sup>, most common locations are Lower extremity (>50%), Spine (10-15%), Hand (5-10%), and Foot (<5%)<sup>(2)</sup>. The main symptom is sharp local pain, can be constant or episodic, and mostly increases during night or physical activity or with drinking alcohol, the pain is intense dull which is typically severe and responsible for nocturnal awakenings. Pain can be relieved by NSAIDs and may be there is a local swelling<sup>(2)</sup>. Diagnosis is done by Detailed history followed by Physical exam: There may be bone deformity, swelling, erythema, tenderness. Plain X-rays are not usually sufficient to determine the

lesion, Computed tomography (CT) cross-sectional imaging is the study of choice, the findings will help to identify the location and size of nidus, usually < 1.5 cm. Technetium-99 bone scan remains the most sensitive tool for localization. The etiology has not yet been fully clarified. However, it is known that the nidus, which is surrounded by the sclerotic zone of reactive bone and usually has a diameter smaller than 2 cm, is responsible for the pathogenesis of the disease<sup>(3)</sup>. The nidus is often single-focus and is a dark red tissue, rich in blood flow. The nidus is composed of highly vascular tissue, rich interwoven osteoid trabeculae, and mineralized matrix with a fibrovascular stroma.<sup>(1)</sup> Long bone osteoid osteomas need to be differentiated from stress fractures, osteomyelitis, Ewing's sarcoma, Posterior spinal element lesions, aneurysmal bone cyst and osteoblastoma. There are currently three therapy options available for treatment of osteoid osteoma: conservative treatment with NSAIDs, surgical resection, and percutaneous ablation (e.g. RFA, cryoablation). Surgical excision of

the nidus is the gold standard in the treatment of osteoid osteoma<sup>(4)</sup>.

The goal of osteoid osteoma surgery is to remove the nidus entirely without causing pathologic fracture<sup>(5)</sup>. Enbloc resection includes the removal of the tumornidus as a single intact whole, encased by healthy tissue . A wide margin occurs when the plane of dissection has been peripheral to the reactive zone (sclerotic area) through normal tissue; a marginal margin describes that the plane of dissection has been performed along the reactive zone; and an intralesional margin is when the tumour has been violated and the dissection is through the nidus<sup>(6)</sup>.the objective of the study was to assess the effectiveness and the complications that had been risen during the surgical procedure of osteoid osteoma using en bloc resection.

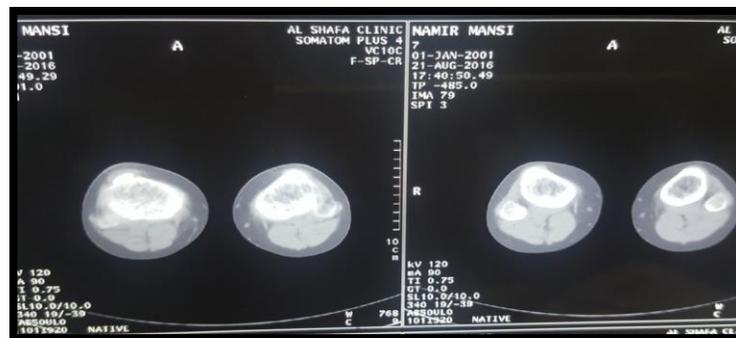
## Methods

Interventional study took place at al Yarmouk teaching hospital from April 2017-october 2018 and included 10 patients.All the patients were diagnosed as osteoidosteoma with Characteristic night pain,Significant pain relief after use of a non-steroidal anti-inflammatory agent or salicylates was reported in all patients that confirm the diagnosis. After undergoing complete history and physical examination a routine Investigation was done such as full blood count, blood group, RH typing ,cross match ,renal function test , random or fasting blood

glucose, plain chest x ray , The diagnosis and operative techniques were based on the clinical findings routinely supported by plain radiographs 3 veiw& thin-section (1–1.5 mm) computed tomography.The surgical procedure was done under general anesthesia,Enbloc surgical resection includes the removal of the tumor nidus as a single intact piece as a whole, excised specimen were sent for histopathological examination.Postoperatively; each patient were assessed by the researcher and his supervisor using visual analogue scale and sleep quality score immediately then after 1,2,4 and 8 weeks.Post-operative antibiotic prophylaxis and analgesictreatment were administered to each patient. Additionally, they were advised to avoid heavy physical activities and sports activities for three months.Clinical and radiological evaluations were performed on patients recommended during follow up checking. Clinical examination focused on pain, movement restriction, force application and walking patterns.The researcher recorded each patients' bone loss during operation in cm,visual analogue scale and sleep quality score.A verbal and written consent was obtained from each patient prior to the admission into the study and the study was approved by the local ethic committee. Statistical analysis was performed using SPSS statistical package for Social Sciences (version 20 for windows, SPSS, Chicago, IL, USA). Differences between groups were evaluated with Student's t-test for qualitative data. ..P value of <0.05 was considered statistically significant



X ray of leg showing



CT scan of the leg showing osteoid

## Results

Sample size included 10 patients.(7) of them were males, (3) of them were females.The mean age of the sample was 22±4 years. One(1) of the lesions was in the right humerus, One(1) of the lesions was in the left proximal Ulna , Five(5) of the lesions were in the shaft of femur , three(3) of the lesions were in the tibia.

All patients had immediate and complete relief of pain after the 1<sup>st</sup>& 2<sup>nd</sup> day post surgery.In one patient there was a complete relief of pain after surgery and then there was relapse of pain that necessitated re-examination & investigation.In one case there was another nidus present and it was operated surgically after 2 months and the nidus identified and excised .Histological confirmation was obtained in all patients with the pre-operative diagnosis of osteoid osteoma and this suggests excellent diagnostic accuracy.Only the patient who had three separate niduses ex-cised at the different times from the tibial shaft middle third required a plaster cast for 6 weeks in order to avoid the risk of fracture postoperatively,,as there were limited block resection there were no internal or external support for the operated bone for all the patient ,,bone graft used in only one case with femoral lesion were large en bloc resection was needed .(less than 1\3<sup>rd</sup> of the femoral width) . These patients began active exercises the day after the operation and they were mobilised partial weight-bearing on the second post-operative day. After 4 weeks all of them could tolerate full weight-bearing,. The patients resumed normal function after 4–6 weeks. The average time in hospital was 2 days.

Complications were as the following : 1 patients developed wound infection after the operation in tibia , 1 pateint needed bone graft during femur operation. There was significant decrease in their median pain scores after 8 weeks of treatment (t test , P <0 .05).Total pain resolution and cessation of analgesics were achieved in 9 of 10 patients after 8 weeks post-operatively.

## Discussion

The aim of treatment of osteoid osteoma is to find and to remove the nidus<sup>(7,8,9)</sup>by en

block surgical resection ,this will immediately relieved of pain. We found this operative management is preferred than continuing on conservative treatment which involve consumption of considerable amount of NSAIDs for long time (from 1 to 3 years) <sup>(3)</sup>. There is no need to remove most of the thickened bone around the osteoid-osteoma lesions as by removing the nidus only through a limited surgical enbloc resection the pain will be relieved and the resulting defect will heal <sup>(3,10)</sup>.while in the minimally invasive surgical techniques <sup>(7)</sup>we have the disadvantages of incomplete resection which may lead to persistence of symptoms with high risk of recurrence of the lesion plus the inability to examine the lesion by histopathological examination <sup>(11)</sup>to confirm the diagnosis.The advantages of open surgical treatment include direct visualization and excision of the of the nidus which is associated with high rate of success <sup>(12)</sup>.Although Wide block resection of the nidus has several disadvantages ,as some times It is difficult to know how much bone to remove,this was eliminated in our study by using image intensifier intraoperatively to localize the nidus and minimize the resection area , another disadvantage is a big bone defect resulted from enblock resection this may necessitate using grafts and internal fixation, and increase the period of post-operative immobilization & hospital staying<sup>(13)</sup> . However in special cases such as the femoral neck and talus, where removing the nidus will weaken the bone ,we prefer a limited block resection with bone grafting in order to produce early bone consolidation and decrease the risk of fractures ..In our 10 patients, neither internal fixation nor external support was needed as the exact site of the nidus was determined before operation by CT and radiographs. Thus during operation only minimal cortical bone had to be removed to allow total excision of the nidus after localizing the site & its surrounding a multiple drill holes using 3.5 drill pit was done to facilitate total resection by hummer & osteotom. .We do not use any other methods of localizing nidus such as pre-operative injection of technetium 99 methylene diphosphonate and intra-operative probing, or injecting tetracycline pre-operatively and examining the specimen under ultraviolet light

are necessary<sup>(14, 15)</sup>. Xiaoning et al (N=14)<sup>(16)</sup> had concluded that conventional excision surgery of osteoid osteoma was effective and safe treatment, associated with a low local recurrence and complication rate. This is also confirmed by Lin et al (N=14) who had concluded that the niduses of osteoid osteomas can be eradicated by open surgery with 3-D C-arm scan under the guidance of computer navigation with minimal damage to bone structure and a high rate of pathologically confirmed diagnoses.<sup>(17)</sup>

Al Qurashi et al (N=12)<sup>(6)</sup>, & Lakdawala, et al<sup>(18)</sup> also concluded that with osteoid osteomas, only complete surgical excision ensures the least risk of local recurrence, and effectively provides immediate pain relief and early mobilization can be performed sometimes quite simply and safely. Elzohairy et al.<sup>(19)</sup>, Alemdar et al (N=104)<sup>(15)</sup>, Kaiser et al<sup>(20)</sup>, all of these studies confirmed in their research that en bloc resection of osteoid osteoma lead to great improvement of pain within the first post operative days, by a simple easy procedure that does not require extensive surgery with high success rate (95-100%). Confirm the results with our study. Incomplete excision of nidus or the presence of other nidus might may persist the symptom & pain discomfort as seen in only one case in our study which necessitated another open surgical operation for en bloc resection of the new nidus.

**Conclusion:** En bloc resection of osteoid osteoma is very safe and effective procedure in certain circumstances with a very low complication rates.

### **Recommendation**

1. A further study with large number of patients.  
2. A comparative study with local excision of the nidus to be done

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