

# *En bloc* (Open) Excision in the Treatment of Osteoid Osteoma

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## Abstract

**Background:** The standard treatment for osteoid osteoma (OO) is conventional (*en bloc*) open excision. The study aimed to discuss the clinical outcomes and complications of the conventional (*en bloc*) open excision.

**Methods:** Twenty-five patients with OO were treated with (*en bloc*) open excision during a period from January 2015 to June 2020. The clinical findings and radiological investigations and the operative data were recorded. Radiological assessment was based mainly on plain X-rays. The mean age of patients was 18 (range 16-32) years and the follow-up was ranged 3-5 years. The bone excised was sent for histopathology.

**Results:** Pain improved in 20 (80%) patients at the first week postoperatively. In five patients (20%), the improvement gradual-onset during the first 6 months. The complication included increased pain, foot drop, proximal fibula, neuroparaxia and hematoma. There were no OO recurrence, no pathological fracture, and no postoperative infection.

**Conclusions:** Open (*En bloc*) excision of OO has the risk of increased morbidity and complications. When recommended, there are must be unavailable facilities and equipment to perform percutaneous procedure.

**Keywords:** Osteoid Osteoma; Open Excision; *En bloc*

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## Introduction

Osteoid osteoma (OO) is one of the most common benign neoplasm of bone, predominant in adolescents and young adult's male patients [1], and characterized by small, distinctive, non-progressive, and osteoblastic lesion [2]. It may occur in any site, but the common site is the appendicular bones. It is classified as cortical, cancellous, or subperiosteal. Cortical lesions are the most common [3]. In over 50% of cases, the lesions are centered on the cortex of femoral and tibial diaphysis, and mostly situated in cortico-diaphyseal or metaphyseal parts [4,5]. Radiologically characterized by small radiolucent area (nidus) surrounded by a thick zone of sclerotic bone. Several treatment options perform for OO, started from excision of the nidus [6], to percutaneous CT-guided core-drill excision [7], destruction of the nidus using radio-frequency thermo-coagulation [8], laser [9], or ethanol injection [10]. However, complete surgical excision was the gold standard for the treatment.

Here, we try to discuss the clinical outcomes and morbidity associated with (*En bloc*) open excision in the treatment of OO.

## Methods

Twenty-five patients with OO were diagnosed and prospectively

treated with conventional (*En bloc*) open excision between January 2015 and June 2020. The diagnosis was established from history, clinical examination, and radiological investigations. Radiological assessment was based mainly on plain X-rays. The clinical findings and radiological investigations and the operative data for all patients were recorded. A written consent was taken from every patient before the start of the study.

Overall, bone grafts were used in 12 patients: auto-grafts from the iliac spine in eight and synthetic bone graft material in four patients. The removed bone was routinely sent for histological examination.

Patients were followed-up every four weeks/three months to evaluate bone healing, residual symptoms, and potential complications. Complete relief of pain and union of the original tumor site at a minimal one-year follow-up were considered as curative. Then the patients were followed-up once every year until the end of follow up period.

## Results

Of the 25 patients, 20 patients had the tumor located in the lower extremities, which included three cases with the tumor in the proximal femoral metaphysis, two in femoral neck, five in lesser trochanter, two in the femoral diaphysis, two in the proximal tibia, two in the tibial



diaphysis, three in the distal tibia, and one in proximal fibula. Five patients had the tumor located in the upper extremities which include three cases in the radial styloid process and two in ulnar diaphysis (Table 1).

**Table 1:** Variables distribution of this study (n=25).

		No.	%
Age (years)	Median (range)	18 (16-32)	100
Gender	M	25	100
	F	0	0
Symptoms	Pain	20	80
	Limping	5	20
Pain site	Elbow	2	8
	Wrist	3	12
	Hip	7	28
	Thigh	5	20
	Knee	3	12
	Ankle	3	12
	Lower leg	2	8
Sites	Lesser trochanter	5	20
	Proximal fibula	1	4
	Distal tibia	3	12
	Proximal tibia	2	8
	Femoral neck	2	8
	Femoral diaphysis	2	8
	Femoral metaphysis	3	12
	Tibial diaphysis	2	8
	Radial styloid process	3	12
	Ulnar diaphysis	2	8
Disease duration (years)	<1	9	36
	1-2	8	32
	>2	8	32
Follow-up (years)	<1	1	4
	1-2	6	24
	>2	18	72

Substantial improvement regarding pain intensity was documented in 18 patients during the first week postoperatively. In seven patients, improvement came gradually during the first six months postoperatively. Two patients developed partial foot drop, because of the tumor was in the proximal fibula. No patient developed tumor recurrence. No pathological fracture or wound infection occurred postoperatively.

## Discussion

The natural history of an untreated osteoid osteoma is natural regression, which occurs within 6 to 15 years but can be reduced to 2 to 3 years with treatment with analgesia such as NSAIDs [11]. However, the side effects of long-term use of medication and the lack of histological diagnosis are still a major concern in conservative treatment [12].

Generally, the treatment aiming to destroy the nidus varies depending on the location of the lesion, experience of the surgeon, facilities, and equipment of the hospital. Complete surgical excision, was the treatment of choice for osteoid osteoma, with a low recurrence rate, but conventional method is the *en bloc* open wide excision [2,6].

Yildiz Y, et al. (2001) [13], treated 104 with wide resection, and reported a success rate of (86.7%) with an average follow-up of 2.5 years. Favorable results have been reported using percutaneous drill resection [7], cryo- or radiofrequency ablation [8], thermal destruction by laser photocoagulation [9], and drill resection plus injection of ethanol [10].

Roger B, et al. (1996) [14], reported 16 patients treated by percutaneous CT-guided excision and had good results in 14 patients. Muscolo DL, et al. (1995) [15], reported superior outcomes of CT-guided minimally invasive surgery rather than open surgery. A study evaluated CT-guided percutaneous trephine removal of the nidus in 18 cases of osteoid osteoma, demonstrating that this is a safe and effective method for surgical resection of the lesion with reduced hospitalization time and less postoperative pain [16].

Yet, the difficulty to localize the nidus perioperatively is common, but for symptomatic relief, the entire nidus has to be excised completely [17]. This resection has the drawback of an open surgical approach with excision of sclerotic bone wider than what it should be, resulted in a bone defect which may require bone grafting and internal fixation with consequent restrictions on postoperative activities and weight bearing [18]. All these are factors lead to increase hospital stay, cost and morbidity.

The major complication in the current study was a case of compression neurapraxia of the lateral popliteal nerve after resection of osteoid osteoma in a proximal fibula.

On the other hand, most minimally invasive techniques require special instruments, facilities, and medical expertise, and result in reduced cost, shorter hospital stay and rehabilitation, faster return to work activities, and lower risk of associated complications, morbidity and recurrence rate [19,20]. Furthermore, intra-articular OO was reported to be removed arthroscopically [21]. However, the minimally invasive techniques are not indicated in most cases of OO of the spine, in close anatomical relationship to dural and neural structures [6], in OO of small bones, or in cases of recurrent lesions. They should also be avoided when the lesion is close to a neurovascular bundle and in those more than one cm across in which multiple perforations and supplementary percutaneous curettage should be used. There is also the disadvantage of the lack of histological confirmation in most cases [2].

Regardless of the technique used, complete removal or destruction of the nidus is necessary to obtain a successful outcome [22].

## Conclusion

Conventional (*en bloc*) open excision of OO avoid recurrence and leads to gradual improvement in pain intensity. The recommendation of *en bloc* surgical excision perform when hospitals facilities and equipment are unavailable to percutaneous excision.

## Conflict of Interest

None.

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