

## A Prospective Assessment of the Clinical and Radiological Outcome of Intralesional Methylprednisolone (1g in 10 MI Distilled Water) in Aneurysmal Bone Cyst

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### Abstract

**Aim:** This study aims at comparing the hemodynamic variation between low dose oral clonidine (100mcg) and placebo group in laparoscopic surgeries.

**Material & Methods:** 60 consecutive patients undergoing laparoscopic procedures of 90 to 180 minutes were enrolled into the study. Inclusion criteria was ASA (American Society of Anesthesia) I and II in the age group of 18 and 70 years. Exclusion criteria were patients of ASA III and IV, patients on antihypertensive medications and patients with known cardiac disease.

**Results:** A statistically significant difference and reduction in heart rate was seen in clonidine group compared to placebo group at various interval. At 90 and 120 minutes, systolic and mean arterial blood pressure was similar between the clonidine and placebo group.

**Conclusion:** Low dose oral clonidine is a very efficient, easy to administer and cost effective premedication drug during laparoscopic procedures.

**Keywords:** Low dose clonidine, Pneumoperitoneum, Laparoscopic surgery, Heart rate, Blood pressure

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### Introduction

Aneurysmal bone cyst (ABC), first described by Jaffe and Lichtenstein in 1942. The World Health Organization defines ABC as an “expanding osteolytic lesion consisting of blood-filled spaces of variable size separated by connective tissue containing trabeculae of bone or osteoid tissue and osteoclast giant cells.” It is considered an active or aggressive benign bone tumor that may result in high

morbidity and recurrence if not properly treated [1]. It is an active/aggressive benign bone tumor, which may result in high skeletal morbidity and recurrence if not accurately treated [1,2].

ABC accounts for approximately 1% of all primary bone tumors and most commonly occurs during the first and second decades of life, with a slight predominance in

females [1,3]. The main affected sites are the distal end of the femur and proximal end of the tibia [1,3]. The optimal treatment for ABC is controversial and several methods have been reported. The recurrence rate ranges from 5% to 40%, depending on the method of treatment used [3,4]. Currently, the most widely used method is curettage combined with grafting [1,3-5]. This method results in a high relapse rate, prolonged recovery period, risk of bleeding, and damage to surrounding structures essential for maintaining the function of the affected segment, especially in vertebral and pelvic lesions [5-7].

The traditional surgical methods result in high recurrence rate, high morbidity, and prolonged recovery period and carry a significant risk of bleeding and damage to surrounding structures essential for the maintenance of function of the affected segment [8,9]. Furthermore, for spinal lesions, which can be very vascular, surgical treatment is technically challenging with the risk of significant blood loss, postoperative spinal deformity, and the possibility of recurrence [9-11]. Thus, minimally invasive methods have been initially proposed to treat ABC in sites with difficult surgical access, especially the spine and pelvis, as surgical treatment results in increased morbidity.

Percutaneous MPSS injection therapy has emerged as a safe and effective treatment method for aneurysmal bone cyst in recent years and obviates the surgical complications and promotes ABC healing [12]. The main objective of this study was to assess the clinical and radiological outcome of MPSS (1g in 10 ml distilled water) in ABC. Secondary objectives were to assess clinical efficacy in terms of pain and to analyze recurrence and complications.

### **Methodology:**

A prospective study at the Department of Orthopaedics, Darbhanga Medical College

and Hospital, Laheriasarai, Darbhanga, Bihar, India from March 2018 to February 2020 . with the 10 patients diagnosed with primary ABC managed by MPSS was included. All patients presented with active or aggressive ABC based on the Capanna classification [13]. All patients with ABC were investigated with plain X-Ray, CT/MRI pre-operatively. Percutaneous biopsy was performed on all the suspected patients and a histological diagnosis was obtained. After the biopsy report, treatment was started. All patients with secondary aneurysmal bone cyst were excluded from the study. On follow-up, X-ray and MRI were done at 3 months, 6 months, 1 year and 2 years interval. VAS score was used for pain assessment.

The advantage and risks of the procedure were explained to the patients and relatives and written consent was obtained. The procedure was performed under Short general anesthesia on a simple table, supine position. Prophylactic antibiotics were given half an hour before MPSS injection. Painting and Draping was done. An 11-gauge bone marrow biopsy needle is inserted into the lesion with the IITV guidance until it reaches the largest lytic portion of the tumor. The cyst walls were manually scarified using the end of the needle to break the non-healed septa and the content inside the cavity was aspirated. Then, 1g methylprednisolone in 5 ml of the syringe and another syringe containing 10 ml distilled water were attached to the bone marrow biopsy needle. The solution was injected into the lesion. A pressure dressing was applied and maintained for 3 days. Hospital stays were of 2-3 days. In case of non-ossification or persisting pain, repeat injection was suggested; the interval between injections was 8 weeks. Patients were asked to avoid strenuous activity and contact sports until the radiological healing. On each follow-up, the treatment response was recorded with complications and functional assessment.

### **Results:**

Out of 10 patients, 4 were females and 6 were males with the mean age of 14 years (range: 6–18 years). Classical ABC on pathologic analysis was seen in 7 patients. The mean follow-up was 16.8 months

(range: 6–24 months). 1 patient had less than 1 year of follow-up, including no patient lost to follow-up; only clinical efficacy and complications were studied in these cases.

**Table 1: Patients details (IR-SR = Inflammatory reaction with spontaneous resolution)**

Patient	1	2	3	4	5	6	7	8	9	10
Gender	F	F	M	M	M	F	M	M	F	M
Age	6	7	8	8	9	11	14	16	16	18
No. of injections	1	1	2	1	1	2	1	2	1	1
Ossification	Complete	Complete	Complete	Complete	Partial	Complete	Complete	Absent	Complete	Complete
Complications	-	IR-SR	Pain	-	-	-	-	IR-SR	-	-

In the group with up to 2 years' follow-up (n=10), ossification was completed in 8 cases (80%), partial in 1 (10%) and absent in 1 (10%) case. There were no recurrences. Pain resolved (VAS = 0) in 9 patients (90%) by 3 months after injection course. One patient had persistent pain after the second injection. There were 2 cases of inflammatory reaction with spontaneous resolution. There were no cases of infection or complex regional pain syndrome. Improvement in the functional score correlated positively with the reduction in the size of the lesion. The functional score at the end of the final follow-up was significantly better than that at the end of the initial treatment.

#### Discussion:

ABC is a rare, locally destructive benign bone tumor with a prevalence of 1.4 cases per 100,000 individuals. The lesion may occur in any bone and at any age, although more than 50% occur in long bones and approximately 80% of the cases involve patients younger than age 20 years [1, 3]. Approximately 70% of ABCs are primary and the remaining 30% are secondary to hemorrhagic degenerative events in preexisting bone lesions, including giant cell tumor, simple bone cyst, and chondroblastomas [1]. There is still

controversy exists about the origin of ABCs. Classically it has been considered as AV fistula/malformation in the bone, but it may be denovo [14] or post traumatic [15].

As defined by the World Health Organization, ABC is an expansile osteolytic lesion that consists of blood-filled spaces and channels separated by connective tissue septa that may contain osteoid tissue and osteoclast-like giant cells [2]. This lesion may occur in any bone at any age [2, 16]. However, more than 50% of the ABCs present in the long bones and about 80% of the cases are seen before the age of 20 years [1, 16]. ABCs are considered as primary lesions in approximately 70% of cases, with the remaining 30% arising secondary to different primary tumors, including giant cell tumor, unicameral bone cyst, and chondroblastoma [17].

As regards the primary ABC pathogenesis, currently, the presence of a chromosomal translocation t (16;17) (q22;p13), as a recurring abnormality and overexpression of insulin like growth factor confirms the hypothesis that primary ABC is a true neoplastic lesion [18-20]. Matrix metalloproteinase-9 (MMP) induction in response to the presence of the fusion

protein ubiquitin specific protease 6 plays an important role in the pathogenesis and osteoclast destructive activity [21]. These findings can support bone target therapy based on osteoclast and fibroblast inhibitors, such as calcitonin and methylprednisolone, for ABC treatment.

Although ABC is completely benign, this expansile osteolytic lesion may lead to a pathological fracture [16,22]. Thus, intralesional procedures, such as curettage with or without the use of burr, bone marrow injection, or bone grafting, are the most common treatment options, and resection is primarily used in expandable bones, such as the fibula, clavicle, or rib [1,2]. Recurrence is frequently seen within 24 months following the initial treatment and ranges from 10% to 59% with different surgical removal techniques [2, 22].

In the present study, a complete resolution with minimally invasive treatment for ABC was seen in 80% of cases. The constant presenting symptoms were pain on exertion and difficulty in daily activity (i.e., writing and walking running etc). VAS score was used to determine the pain severity and treatment efficacy. Satisfactory result was obtained with complete ossification in 8 patients (80%). Only 1 (10%) patient showed partial ossification and absent ossification was seen in 1 (10%) patient. These findings are similar to study by Marcove et al. [23] who used curettage and cryotherapy and got value of 90% (63% to 100%). [24]

Maximum of 2 injections of MPSS was given to the patients. Even after the completion of the treatment, radiological and clinical improvements in the patients were recorded and this is suggestive of ongoing healing process. Only 1 patient with the absent ossification was treated with curettage and bone grafting later on. No major complications were observed in our study. Only 1 patient had complained of local injection site pain.

## Conclusion:

On the basis of the results of this study, it can be said that there is potential scope of methylprednisolone treatment in Aneurysmal bone cyst of various bones of body with a low rate of relapse that promotes ABC healing. It is minimally invasive procedure with less complications

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