

## A Case report: Aneurysmal Bone Cyst of the Lateral End at Clavicle in a 16-Rear-Old Boy

<sup>1</sup>Dr. Md. Amjad Ali, Ex-Consultant, Department of Orthopaedic, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh

<sup>2</sup>Dr. Mahfuz Ara Begum, Ex-Associate Professor, Department of Obstetrics and Gynecology, Comilla Medical College Hospital, Comilla, Bangladesh.

<sup>3</sup>Dr. Jesmin Sultana, Jr. Consultant, Department of Transfusion Medicine, Delta Hospital Ltd. Dhaka, Bangladesh

<sup>4</sup> Dr. Jahangir Hossain, Associate Professor, Department of Orthopaedic, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh

<sup>5</sup>Dr. Md. Hasan Masud, Ex-Professor, Department of Orthopaedic, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh

Corresponding Author: Dr. Md. Amjad Ali, Ex-Consultant, Department of Orthopaedic, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh. Email: amjadali1960@gmail.com

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### ABSTRACT

**Background:** Aneurysmal bone cyst is an uncommon benign solitary tumor of the long tubular bones, pelvis, and vertebrae that seldom affects the clavicle. It is prevalent in adolescence but unusual in elderly age. The distinctive radiological and histological images validate the diagnosis. This case is noteworthy since only a few occurrences of aneurysmal bone cysts in the clavicle have been recorded to date. **Objective:** The aim of the study was to evaluate Aneurysmal Bone Cyst of the Lateral End of Clavicle. **Case presentation:** A 16-year-old boy complained of pain in the right clavicular area for three months, along with swelling that gradually increased in size. The radiograph revealed an expansile bony mass in the lateral fourth of the right clavicle, with internal septations, cortex thinning, and no indications of periosteal response. The affected portion of the lateral end of clavicle was curated, leaving the thick periosteum intact. The histological section exhibited both solid and cystic regions. The cysts were split by septa and filled with blood. Stroma had loosely packed spindle cells with vesicular nuclei, inconspicuous to prominent nucleoli, and a modest quantity of eosinophilic cytoplasm. Prominent blood vessel proliferation was noted. Pleomorphism and mitotic figures were not observed in the material. The overall histology image was one of an aneurysmal bone cyst. **Conclusion:** Aneurysmal bone cysts are uncommon in the clavicle at this age. This is an uncommon case that warrants mention in the literature. Our instance was treated with limited resection. Regular follow-ups reveal bone regrowth within the undamaged periosteum.

**Key words:** Aneurysmal bone cysts, curettage and bone grafting and clavicle

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### I. INTRODUCTION

Aneurysmal bone cysts (ABC) are benign expansile tumor-like bone lesions with an unknown aetiology, composed of multiple blood-filled channels, and most commonly detected in children and teenagers. There is no sex preference; the highest incidence occurs in the second decade of life. [1, 2] ABC can affect practically any bone; however, the most common sites are long tubular bones and vertebrae. The most common places are the proximal humerus, distal femur, proximal tibia, and spine. The pelvis and scapula are popular places for flat bones. The clavicle is a rather uncommon site for this lesion, and few cases have been recorded in literature. [3] This example will describe a safe treatment method for a tiny bone. Despite fairly characteristic radiological characteristics, the unique age combined with the uncommon site caused diagnostic challenges in the current case report. [4] This is an unusual condition and site for this age group, and it is difficult to detect and cure. Primary bone tumors of flat bones such as the clavicle are uncommon. True benign tumors are far more rare than metastatic or malignant tumors. Aneurysmal bone cyst (ABC) is a benign but locally aggressive bone lesion that accounts for approximately 3% of all bone cancers. Its histology is distinguished by multiloculated cystic tissue containing blood. The etiology and pathophysiology of this condition remain unknown. [5] Although simple bone cysts, aneurysmal bone cysts appear to be benign neoplastic lesions with oncogene (ubiquitin C-terminal hydrolases 6 (USP6)), cadherin 11 (CDH11), and insulin growth factor activity.

[6] Despite their benign character, the recurrence rate of ABCs ranges between 10% and 40%. [7] ABCs are best treated by cyst wall curettage, with or without adjuvant therapy. [8]

## II. CASE PRESENTATION

A 16-year-old child was diagnosed with aneurysmal bone cysts on the lateral end of his right clavicle and treated with curettage and bone grafting. This is a rare ailment, as well as an unusual site for this age group, making diagnosis and treatment difficult. The patient has been monitored for two years with no signs of recurrence. Figure 1 depicts a boy who appeared with swelling in his right clavicular region that had been gradually rising in size for the previous 10 months. The swelling was not unpleasant, and there was no neurological damage. The skin did not adhere to the swelling. He had no past traumatic experiences. His previous medical history was normal.

The swelling steadily expanded in size and reached the size of a lemon at the time of inspection [figure 2], with a smooth surface, slight tenderness on palpation, and no local temperature rise. Consistency was bone hard, with an eggshell cracking sensation. The margins were distinct, and no nearby lymph nodes were discovered. The boy had complete range of motion in his shoulder with no pain. No more comparable swellings were discovered in the body. Radiographs [Figure 3] revealed a well-defined expansile osteolytic lesion with thin sclerotic edges developing from the lateral end of the right clavicle, along with a pathological fracture on the clavicle's inferior border. Thin septations were found within the lesion [Figure 4].



Figure 1: 16-year-old boy

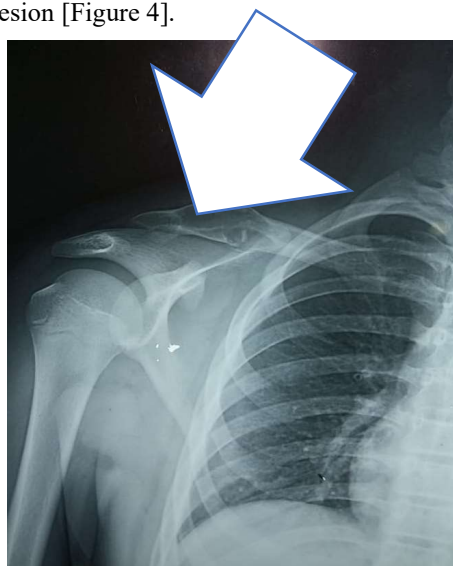


Figure 2: Swelling steadily expanded in size at lateral end of right clavicles.



Figure 3: Radiographs revealed a well-defined expansile osteolytic lesion with pathological fracture at inferior border.



Figure 4: Radiographs with thin septations were found within the lesion

Blood tests, including ESR, CRP, and serum alkaline phosphatase, were within normal limits. An incisional biopsy was conducted and transmitted to two independent laboratories; one indicated an aneurysmal bone cyst, while the other reported a benign fibro-osseous lesion. In this circumstance, curettage was preferred to allograft. The lesion was approached intraoperatively by incising the periosteum longitudinally, as shown in Figure 5. Figure 6 shows the multiloculated cyst, which contain a striped of thrombi. The inner wall was curetted, and the cavity's bleeding walls were sealed by electrocautery. The cavity was further irrigated with phenol with hydrogen per oxide solution.

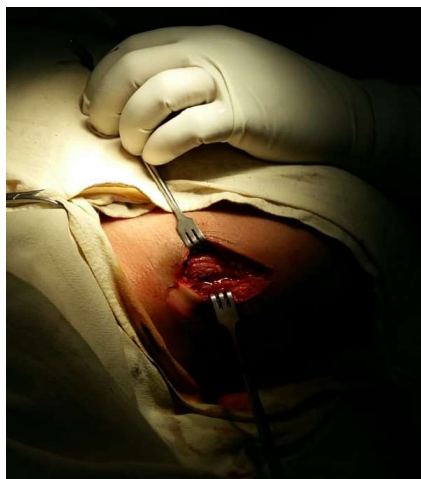


Figure 5: The lesion was approached intraoperatively by incising the periosteum longitudinally



Figure 6: Multiloculated cyst



Figure 7: The cavity was filled with a cancellous allograft strip of bone graft.



Figure 8



Figure 9



Figure 10

Figure 8, 9 and 10 the patient has a full range of motion with no functional issues or difficulty

The cavity was filled with a cancellous allograft strip of bone graft, and the wound was closed (Figure in layers 7). During the postoperative period, the limb was immobilized with a cuff and collar sling. The postoperative phase was uneventful. The preoperative diagnosis was verified through histological inspection of the curetted specimen using ABC. The shoulder was immobilized for four weeks before returning to active movement and physiotherapy. The excision at biopsy results verified the condition as ABC. The patient was followed up at two weeks, three months, six months, and one year. The child returned to school after six weeks. The patient has a full range of motion with no functional issues or difficulty [Figures 8, 9, and 10]. The x-rays revealed full union with no evidence of recurrence [Figure 11]. Recurrence was characterized as the existence of an osteolytic lesion, particularly one that tended to expand.





Figure 11: The x-rays revealed full union with no evidence of recurrence

### III. DISCUSSION

As with any other flat bone, the clavicle is an unusual site for bone tumors, and practically any type of bone tumor can develop there. Secondaries are more prevalent than original bone tumors. According to the research, clavicles account for less than 1% of all bone tumors. Most orthopedic surgeons find it difficult to manage clavicular lesions because of their rarity and variability. When other probable differentials are ruled out and aneurysmal bone cyst is determined to be the diagnosis, it is critical to completely characterize the scope of the disease. Surgical intervention is usually recommended to properly treat the lesion, depending on its size and the patient's level of pain. While some lesions heal on their own, some are so extensive that leaving them alone would put the patient at risk of fracture. Curettage, bone graft/chips, sclerotherapy, marginal excision, and a combination of the aforementioned treatments are now used to treat aneurysmal bone cysts. [9] However, even with excellent surgical treatment, the lesion has a recurrence rate of 15-20%. [10] In this study, we described the surgical and clinical outcomes of ABC patients treated with curettage and bone graft. An ABC typically develops as a primary tumor from trans or as a secondary lesion next to osteoblastoma, giant formation cell tumours, or other forms of tumours. [11, 12] The goal of treatment is to arrest the progression of the lesion, reduce pain, and avoid pathological fracture of the bone. [13] To achieve these therapeutic objectives, the following therapy techniques have been proposed: En bloc resection; curettage with or without bone graft or adjuvant therapy; radiotherapy; a new biopsy technique described by Reddy et al.; sclerotherapy; and embolization. [14, 15] The most appropriate treatment for any instance is determined by the probability of tumor recurrence and the accompanying comorbidities. In this work, we proposed curettage with bone graft as a minimally invasive procedure for the treatment of ABCs and evaluated its surgical and clinical effects.

ABC is an uncommon lesion that affects 1.4 out of every 105 people and accounts for approximately 1% of all primary bone tumors. [16] The conventional therapy is curettage of the lesion, followed by bone grafting. The risk of local recurrence has varied greatly; recurrences are more probable in younger children, those with open growth plates, and within the first two years after surgery. [17, 18] However, curettage with or without bone grafting has been linked to significant recurrence rates. Several supplementary medications are utilized to reduce the rate of recurrence. [19] Varshney et al. examined the literature about the treatment of ABCs and reported a recurrence incidence of around 29.2% when curettage and bone grafting are used. [20] Recurrence rates after curettage range from 9% to 71%. [21] According to a literature study, the recurrence percentage of the 690 ABCs treated by curettage, with or without bone graft, was 31%. Curettage and bone graft seeks to achieve total tumor excision and to stimulate new bone development through direct stimulation of cysts. Jaffe and Lichtenstein developed the acronym ABC in 1942 to describe the typical radiographic features. [21] An aneurysmal bone cyst is a benign but locally damaging bone lesion defined by the presence of spongy or multiloculated cystic tissue filled with blood. It represents 2.5% of all bone cancers. Up to 8% of bone tumors develop in people under the age of 20, with the highest frequency occurring in the second decade. [22]

Most authors propose curettage for primary cysts, with excision reserved for recurrent cases or tumors located in disposable bones that can be surgically removed without the requirement for bone reconstruction. [23] Curettage is a relatively easy technique that usually results in a quick recovery, whereas en bloc excision

has a lower recurrence rate but requires more extensive reconstructive surgery, which comes with associated morbidity. [24] Pain and limited range of motion during follow-up were more likely in cases involving curettage and bone grafting. This could be due to soft tissue damage during an extended surgery, a pathological fracture, or protracted postoperative immobilization. However, this limitation did not interfere with any of our patient's everyday activities.

Curettage with an adjuvant such as phenol, hydrogen peroxide, liquid nitrogen, poly (methyl methacrylate), or argon beam has resulted in a lower recurrence rate by broadening the zone of tissue necrosis to include residual microscopic tumor cells. [25]

#### IV. CONCLUSIONS

Curettage and bone grafting can be recommended as a specialized therapy approach for clavicle tumors, particularly in children and adolescents. Though the case report revealed a better outcome, the authors propose more research to assess the efficacy of curettage and bone graft.

#### REFERENCES

- [1]. Dr. Henry Knipe and A.Prof Frank Gaillard et al. (<https://radiopaedia.org/articles/aneurysmal-bone-cyst>)
- [2]. Leithner A, Windhager R, Lang S, Haas OA, Kainberger F, Kotz R. Aneurysmal bone cyst. A population based epidemiologic study and literature review. *Clin Orthop Relat Res.* 1999;(363):176-9.
- [3]. Freiberg AA, Loder RT, Heidelberger KP, Hensing RN. Aneurysmal bone cysts in young children. *J Pediatr Orthop.* 1994;14(1):86-91.
- [4]. Aneurysmal bone cyst of clavicle. *Br J Radiol.* 1977;50:706-9.
- [5]. Leithner A, Windhager R, Lang S. Aneurysmal bone cyst: A population-based epidemiologic study and literature review. *Clin Orthop Relat Res.* 1999; 363:176-79.
- [6]. Oliveira AM, Chou MM, Perez-Atayde AR, Rosenberg AE. Aneurysmal bone cyst: a neoplasm driven by upregulation of the USP6 oncogene. *J Clin Oncol.* 2006;11: e1. doi: 10.1200/JCO.2005.04.4818.
- [7]. Freiberg AA, Loder RT, Heidelberger KP, Hensing RN. Aneurysmal bone cysts in young children. *J Pediatr Orthop.* 1994; 11:86-91. doi: 10.1097/01241398-199401000-00018.
- [8]. S. Rastagi, M.K. Varsheny, V. Trikha, S. A. Khan, B. Choudhury, and R. Safaya. "Treatment of aneurysmal bone cysts with percutaneous sclerotherapy using polidocanol: A REVIEW OF 72 CASES WITH LONGTERM FOLLOW-UP" *J Bone Joint Surg Br* September 2006 88- B:1212-1216.
- [9]. Chowdhry, Majid, C.R. Chandrasekar, R. Mohammed, and R.J. Grimer. "Curettage of Aneurysmal Bone Cysts of the Feet." *Foot and Ankle International* 31.2 {2010}: 131-35.
- [10]. Ve V, Pringle LM, Lau AW, Riquelme ON, Wang H, Jiang T, Lev O, Weiman A, Blobel GA, Oliveira AM, Chou MM. TRE17/USP6 oncogene translocated in aneurysmal bone cyst induces matrix metalloproteinase production via activation of NF-kappaB. *Oncogene.* 2010; 29:3619-29. <https://doi.org/10.1038/onc.2010.116>.
- [11]. Martinez V, Sissons HA. Cancer. Aneurysmal bone cyst. A review of 123 cases including primary lesions and those secondary to other bone pathology 1988; 61:2291-2304.
- [12]. Park HY, Yang SK, Sheppard WI, Hegde V, Zoller SO, Nelson SO, Federman N, Bernthal NM. Current management of aneurysmal bone cysts. *Curr Rev Musculoskelet Med.* 2016; 9:435-44.
- [13]. Cummings JE, Smith RA, Heck RK Jr. Argon beam coagulation as adjuvant treatment after curettage of aneurysmal bone cysts: a preliminary study. *Clin Orthop Relat Res.* 2010; 468:231-7.
- [14]. S. Rastagi, M.K. Varsheny, V. Trikha, S. A. Khan, B. Choudhury, and R. Safaya. "Treatment of aneurysmal bone cysts with percutaneous sclerotherapy using polidocanol: A REVIEW OF 72 CASES WITH LONGTERM FOLLOW-UP" *J Bone Joint Surg Br* September 2006 88- B:1212-1216.
- [15]. Leithner, A, Windhager, R, Lang, S: Aneurysmal bone cyst. A population based epidemiologic study and literature review. *Clin Orthop Relat Res* 1999; 363:176-179.
- [16]. Cottalorda, J, Bourelle, S: Current treatments of primary aneurysmal bone cysts. *J Pediatr Orthop B* 2006; 15:155-167.
- [17]. Gibbs, CP, Hefele, MC, Peabody, TO: Aneurysmal bone cyst of the extremities. Factors related to local recurrence after curettage with a high-speed burr. *J Bone Joint Surg Am* 1999; 81:1671-1678
- [18]. Oormans, JP, Hanna, BG, Johnston, DR: Surgical treatment and recurrence rate of aneurysmal bone cysts in children. *Clin Orthop Relat Res* 2004; 421:205-211.
- [19]. Varshney, MK, Rastogi, S, Khan, SA: Is sclerotherapy better than intralesional excision for treating aneurysmal bone cysts? *Clin Orthop Relat Res* 2010; 468:1649-1659
- [20]. Campanacci M, Capanna R, Picci P. Unicameral and aneurysmal bone cysts. *Clin Orthop.* 1986; 204:25-36.
- [21]. Hudson TM. Fluid levels in aneurysmal bone cysts: a CT feature. *AJR Am J Roentgenol.* 1984; 142:1001-1004. doi: 10.2214/ajr.142.5.1001.
- [22]. Mankin HJ, Hornicek FJ, Ortiz-Cruz E, Villafuerte J, Gebhardt M. Aneurysmal bone cyst: a review of 150 patients. *J Clin Oncol.* 2005;11:6756-6762. doi: 10.1200/JCO.2005.15.255.
- [23]. Campanacci M, Capanna R, Picci P. Unicameral and aneurysmal bone cysts. *Clin Orthop Relat Res.* 1986; 11:25-36.
- [24]. Gibbs CP Jr, Hefele MC, Peabody TO, Montag AG, Aithal V, Simon MA. Aneurysmal bone cyst of the extremities. Factors related to local recurrence after curettage with a highspeed burr. *J Bone Joint Surg Am.* 1999; 11:1671-1678.