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Case Report

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The Review literature about Chondroblastoma with a case on Talus bone

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Abstract

Background: Chondroblastomas are rare bone tumors, which are the cartilaginous origin and account for nearly 1% of all primary bone tumors. It can affect people of all ages. Chondroblastomas arising in the talus are very rare and are known to have less aggressive behavior. **Methods:** 11 authors, a total of 572 patient data with our talus case, were analyzed for this review literature. Here is the mentioning of epidemiological and clinical information, radiological details, surgery type, adjuvants types, genders, follow-up years, recurrence, affected areas, death rates, successful outcome, MSTS functionality scores, and survival rates by analyzing all data. **Result:** Chondroblastoma was treated by curettage and bone grafting during surgical procedures. This procedure is curative in 90% of cases. There was no recurrence in this study case of the talus. Also, the MSTS functionality score for CB averages 90% more in most of the author's literature, and 0% death rate was reported. **Conclusion:** We believe that chondroblastoma of the talus bone should be considered among the differential diagnosis whenever a neoplastic cause is being considered as the underlying pathologic entity. We present a review of the literature detailing their occurrence, radiological findings, and treatments and to report functional outcomes after treatments, which have been rarely documented in a large series.

Keywords: Talus, Case, Chondroblastoma, Review.

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INTRODUCTION

Chondroblastoma is a benign bone tumor that frequently arises in epiphyseal regions of young patients. The main risk is the local recurrence of the tumor, which occurs mostly due to incomplete surgery and its inherent biological aggressiveness. In very unusual cases, they present with extraosseous extension and a soft tissue mass. A metaphyseal extension may occur in 60% of cases, and calcifications are often present. About 20% of cases show cystic and hemorrhagic lesions. Sometimes it can follow a more aggressive course, invading the joint spaces and adjacent bones [1]. We agree with Bloem and Mulder [2], who observed that chondroblastoma, has a peculiar affinity for the talus and calcaneus [3]. This study's aim is not to discuss the accuracy or outcome of chondroblastoma treatment; but to look for the bulk of the information and compile clinical information, surgical, recurrence rate, radiological findings, complications, functionality after surgery, and gender ratio for better analytical understanding as a review. With the development of medical science, new methods and techniques are continual by doctors, resulting in better and more efficient.

CASE REPORT

Medical record information's

General information

13 years old male patient. There was no obvious incentive Pain, swelling, aggravation *half a year ago*. *After attend some activities there was discomfort. Patient take orally indomethacin and slightly pain was relieved. Patient Feel serious pain if stopping the drug and there was no history of trauma. Patient was admitted in hospital June 2018.*

Physical examination

Swelling, especially internal hemorrhoids, refused to press, local skin temperature is high, no recent

development of Heat, chills and haemorrhage. (*Figure 1*)

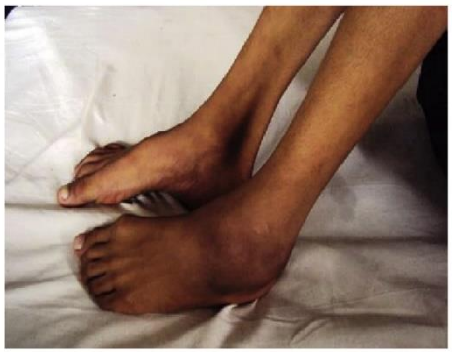

Figure 1: showing swelling over the anterolateral aspect of the left ankle before surgery.

Laboratory tests

No abnormalities were found in the laboratory tests.

Ankle radiology

X-ray: Left Irregular low-density shadow of lateral skeletal bone, border is still clear, and the joint between the joints Gap blur (*Figure 2:A*); CT (Computerized Tomography) shows: the left talus density increases, the outer side sees large a patchy low-density shadow of about 2.8cm × 3.0cm × 2.3cm with flocculent high-density (*Figure 2:B*); MRI (Magnetic Resonance Imaging) shows: left Irregular expansive bone destruction on the medial side of the talus, slightly longer T1 & T2 Signal shadow, T2W lesion signal is not uniform, the boundary is clear, and there is no connection around, continued low signal (*Figure 2:C*).

Admission diagnosis: Left talus swelling tumor. The patient underwent talus tumor biopsy under general anesthesia on the left ankle joint intra-lateral 5cm curved incision; during this procedure, the cortex of the posterior medial talus was thinned. Dark red, exposed lesions can see on destructed talus bone, use a curette for tumor tissue scraped off, the cortical bone was soft, and the tumor tissue was dark red. An appropriate amount of tumor tissue was sent for examination, and the wound was sutured layer by layer afterward; the wound was bandaged. (*Figure 2:D*)

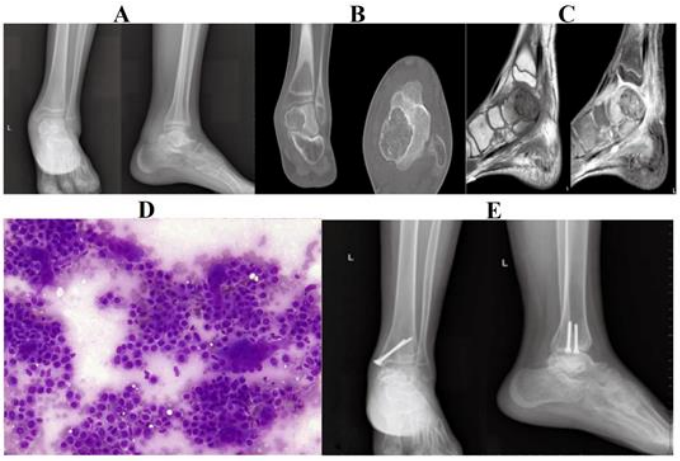

Figure 2: 13 years old male patient on left talus cartilage tumor. A- Pre-operative X-ray lateral position; B- preoperative CT picture; C- preoperative MRI picture; D- Cytological examination: mononuclear cells arranged in a dissociated pattern with intermingled multinucleated cells; E- post-operative X-ray review after half a year surgery.

Intraoperative pathology: After a week curettage of talus tumor, bone grafting were performed by roll the medial malleolus distal to expose the medial left talus bone cortex, and osteotomy was performed above the metaphysis of the distal tibia to expose the bone with the incision of the ankle joint was about 15 cm. The talus bone was removed and a curette Inserted for inactivating the tumor tissue with carbolic acid and anhydrous alcohol, the right iliac crest was taken a 4×2 cm bone was implanted in the talus defect, and the medial malleolus was replaced with two pieces. 2 titanium lag screw use to fixes the internal iliac crest and sutures the wound layer by layer. (*Figure 3*)

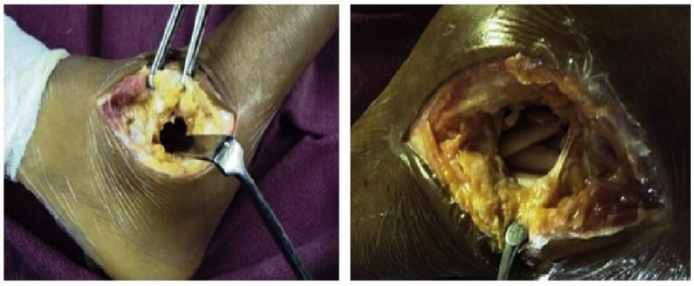

Figure 3: During intraoperative image showing that cavity after adequate curettage of the lesion and filling of the cavity with bone graft.

Postoperative pathology: After half a year, re-examination showed no swelling of the left ankle, normal ankle movement, and no lameness. There was no pain when walking with weight, left ankle X-ray showed positive ankle space often, talus bone changes, no signs of tumor recurrence (*Figure 2:E*). *Last follow-up was done March 2020.*

Methods and Design

The formal review was done of all published literature from the last 30 years related to chondroblastoma in internet-based journals and PubMed. Was performed to optimize and capture all relevant studies. The strength of evidence was then graded for chondroblastoma treatment outcomes. Level of evidence for our studies collected from different author's published articles with a total of 573 patients, including our talus bone case. We analyzed the patient's clinical and surgical information according to our designed plan.

RESULT

In this case, the lesion was completely scraped away, and the lumen was extinguished live to reduce tumor recurrence, from body iliac bone graft, postoperative pain symptoms. The disease is improved, but there is a possibility of recurrence and distant metastasis, so it needs to be determined Periodic review follow-up according to the period of time. After 21 months of post-operative follow-up no recurrence and remodelling the talus bone (*Figure 4*). If the lesion was cleared, combined adjuvant therapy could reduce the recurrence rate of tumors such as liquid nitrogen or anhydrous alcohol. However, according to literature recurrence rates between 3 to 13%, and this is not very high recurrence as other bone tumors. Curettage and bone grafting were used most of the surgical case, which outcome was successful along with high MSTS score 90% plus average. Surgical treatment and radiological findings are very crucial for this infection on the bone because there is a high possibility of transforming as a malignant bone tumor. The only significant factor related to recurrence was the location of the lesion. On the other hand, there is a fluoroscopy technique (*Figure 5*) apply for CB is interesting, but more study should be done. Moreover, RFA (Radiofrequency ablation) treatment could be considered as first-line CB alternative treatment because of the successful outcome with less recurrence rate. According to all of the author's literature, surgery is the

primary treatment of choice for CB and includes complete surgical curettage with or without bone grafting, en bloc resection, or rarely, amputation. Chemical cauterization with phenol or cryosurgery can also be used as adjunctive therapy. Radiation therapy was used previously in conjunction with surgery, either preoperatively or postoperatively; however, the current belief is that radiotherapy should be avoided, as it can stimulate malignant progression.

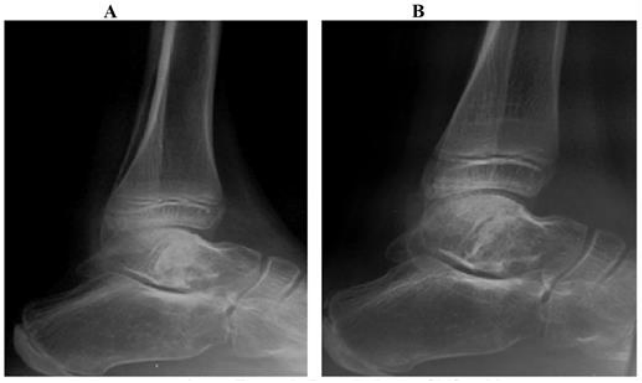

Figure 4: A- Postoperative radiograph of the left ankle at 1-year, showing remodeling of the talus bone and incorporation of the bone graft. B- Postoperative of left ankle at 18 months of follow-up showing no recurrence of the lesion and adequate incorporation of the bone graft.

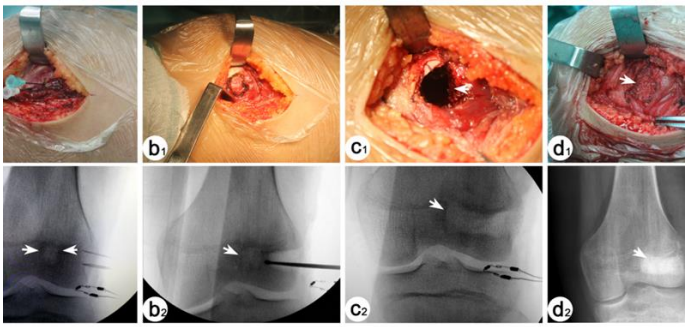

Figure 5: The specific steps of the surgical procedure and the intraoperative fluoroscopy. (a1) and (a2) Two needles were inserted on the lateral side of the distal femur to locate the plane of the lesion and determine the exact location of the lesion by fluoroscopy (arrow denotes lesion). (b1) and (b2) The location of the fenestration was determined according to the results of the previous fluoroscopy, and then the lesion is fenestrated from the lateral femoral condyle with a grinding drill to avoid injury to the growth plate. (c1) and (c2) the lesion was scraped out by stealth from the outside, and a distinct low-density change of the lateral condyle of the distal femur was observed by fluoroscopy. (d1) And (d2) Allograft was used to repair the bone defect after focal curettage, and the original bone defect areas were found to be high-density grafts by fluoroscopy after the operation (arrow denotes the allograft) [30].

DISCUSSION

Epidemiological characteristics

Chondroblastoma is also known as Chondrocyte tumor is a benign bone tumor of cartilage origin. 1927 For the first time, [4] described CB as "cartilage-containing giant cells." Tumor, then Ewing, Codman [5] called it "calcification," "giant cell tumor," "megacytoma of sacral cartilage," they all recognize CB is a variant of giant cell tumor of bone. Until 1942, Jaffe and Lichtenstein [6] found that CB is different from a giant cell tumor and occurs in long bones. The incidence of CB is extremely low. It can destroy long bones such as the humerus and femur. The plate involves the metaphysis, and the tumor is completely located at the metaphysis or the backbone. CB can also happen in the atypical parts such as the hands, feet, tibia, and ribs acetabulum; however, it is rare, and the talus is 4% of all CB patients [7]. CB can occur at any stage of growth and development, as reported by Dahlin *et al*. of the 125 patients with CB, 90% occurred between 5 and 25 years old, and the ratio of male and female was 2:1 and average MSTS score of 91.2% [8-9]. 25 cases reported by Davila *et al*. occurred in the hands and feet, 22 occurred in the foot and were located in the calcaneus and talus, the ratio of male to female is 5:1 [10]. Jiang *et al*. [11] found 18 cases of atypical In patients with CB, 55.6% of those aged >25 years, the ratio of male to female is 2.6:1 and average MSTS score of 93 %. So, it can be seen that CB occurs in children or adolescents, and more in men; talus is the predilection site of foot CB; atypical site CB patients among men are more likely to be sick and older.

Clinical manifestations

CB clinical manifestations are non-specific, but local Pain and swelling are the most common. Pain is intermittent or persistent; it can last for months to years and is aggravated after the event. Some patients may have restricted proximal joint activity, fluid accumulation in the joint cavity, and even pathological bone Folding, muscle atrophy, and lameness [12]. Typically, chondroblastoma affects a single bone, but it can involve two distinct anatomic sites [13], and pain is the most common symptom, usually present for less than 1 year [14-16]. Ramappa *et al*. [17] reported that tumor locations near the hip, including the proximal part of the femur and the pelvis, are at greatest risk for recurrence. In a report of chondroblastomas in a pediatric population, recurrence was as high as 32% [18]. However, men's ratio is much higher than females, and most of the patients are young and young adults and affected before 25 years old.

Diagnosis

In the general view, the appearance of the tumor tissue is brown-dark Red, with sand-like calcification inside. Microscopically: tumor tissue is mainly soft Osteoblasts, osteoclast-like giant cells, and cartilage-like stroma. Soft Osteoblasts are the main components of CB, which are round or polygonal. Large and tightly packed, cytoplasmic transparent, mildly eosinophilic, there is often a longitudinal nucleus; osteoclast-like giant cells are unevenly distributed; the cartilage-like matrix is eosinophilic and is distributed around the cartilage. Sometimes there may be fine line-like calcium deposits around the cartilage, called "window Grid-like calcification," which is considered to be a typical pathological feature of chondroblastoma Sign but only found in 1/3 of the cases. Immunohistochemical S-100 positive is one of the important diagnostic criteria for the disease [19]. Low incidence of chondroblastoma, clinical manifestations, imaging findings both lack specificity, and the preoperative diagnosis rate is low. To understand the imaging findings of CB are important for improving the preoperative diagnosis rate of CB.

Differential diagnosis

Chondroblastoma is often associated with the following four types of swelling tumor identification. Giant cell tumor of bone: This is an aggressive but benign bone tumor found more frequently in young adults between 20 to 40 years old, common in long bone, and the backbone is at the end. Aneurysmal bone cyst: This is not a true tumor but a process in which there is a regular expression of bone with the formation of a multi-loculated fluid-filled cyst cavity with rich blood supply often seen in children and young adults 40%. Cartilage mucin-like fibroids: This type of tumor is more common in the long bones, it is eccentric and cystic, and in the low-density area of the shell-like calcification is rare. Endogenous chondroma: This type of tumor occurs

in 20 to 40 years old, more common in short tubular bone, calcification can be seen in the bone destruction area, and extensive edema letters are rare around numbers.

Treatment and prognosis

CB is not sensitive to chemotherapy and radiation therapy. It is induced that the possibility of malignant transformation is based on surgical treatment. Surgical treatment, the choice of diversity depends mainly on the location, extent, and joint of the lesion. There is no involvement of other aspects. Currently, the most commonly used procedure is lesion scraping bone graft Surgery. Suneja *et al*. [19] reported 53 cases CB patients with simple lesion curettage; all patients were followed up at least two in the year, the longest follow-up was 27 years, of which 7 (13.2%) occurred in situ and recurrence, long-term functional recovery (average MSTS score of 94.2%). Lehner *et al*. [20] reported 24 patients with CB lesions after curettage, among which 15 cases were implanted with autologous bone or mixed with allogeneic bone, and 5 cases only used bone cement Filling, average follow-up of 85.8 months, only one case (4.2%) occurred in situ, and the patient's function recovered well. LCDR Brett *et al*. [3] reported 42 patient with CB on foot 83% were men, mean age 25.5 years, 10-38% recurrence rate, cystic changes were noted 52%, total follow-up was 24 months, treatment consist of thorough curettage and bone grafting with 80% more MSTS score. Therefore, do not damage when surgically scraping the lesion adjacent to the articular surface and the unclosed epiphysis, so as not to cause adjacent joint bone arthritis and growth deformity. After the lesion is cleared, the lesion needs to be filled up. Body bone, allogeneic bone, or bone cement to restore the anatomical structure. Water filling bone Not only is mud cheap, but the heat dissipates when bone cement sets, killing the residue cancer cells, reduce the rate of tumor recurrence, but heat dissipation can also damage the tumor Adjacent articular surface and epiphyseal plate. Mashhour *et al*. [21] reported 14 cases of clear lesions in addition to the combination of liquid nitrogen cryotherapy with autogenous iliac bone transplantation in CB cases, postoperative average follow-up was 49 months, and the recurrence rate was 7.1% (the average MSTS score was 92.7%). Other surgical methods include simple lesion curettage, and lesion scraping Fill with autologous bone or bone cement, curettage alone, endoscopic curettage, endoscopic curettage with cementation, curettage with fat implantation, resection with allograft replacement, marginal resection radio frequency ablation, and osteochondral autograft transfer, have also been used with some success [22]. Hairong *et al*. [23] reported 145 male patients with a mean age of 18.0 years,55 are proximal tibia, 52 are proximal femur, distal femur 38, 73.4% (146 of 199 patients) experienced pain, adjuvant application of phenol was used in 154 patients, duration was 62.1 months, initial treatment was curettage for 119 patients (94.4%) and en bloc resection for seven patients (5.6%), local recurrence rate was 5.0% after curettage and 0% after resection, en bloc resection was performed in 7 patients whose defects would have been unreconstructible after curettage, the male: female ratio was 2.7:1, 96.5% of the lesions occurring proximally, Pain was the primary presenting symptom in (73.4%) 146, overall local recurrence rate was (4.8%) 6, mean MSTS score was 29.4 points (rage 22 to 30), they suggest that curettage and bone-grafting provide favorable local control and satisfactory functional outcome for patients with this disease. Onur *et al*. [24] reported 11 chondroblastoma cases treated at their institute between 2003-2013, underwent intralesional curettage +/- bone grafting, The mean follow-up period was 6.1 years., there were 3 recurrences, MSTS score was 21(17-26), there were 2 female,9 male patients and mean age was 21. There are also reports of shooting minimally invasive techniques such as frequency ablation [25], and endoscopy [26] can also be used for the treatment of CB. However, the number of cases is small, and the follow-up time is short. Although chondroblastoma is a benign tumor, it has a good prognosis partial local recurrence, and distant metastasis is possible. Ramappa *et al*. [17] reported that CB had a local recurrence rate of 10% - 35%. Sohn [27], this tumor may metastasize to lung ENREF [19]. Possibility of postoperative recurrence incomplete removal of lesions, intraoperative field contamination, or tumor cell implantation Factors is relevant [28].

Unfortunately, there are no reliable methods or ways that could predict the risk of local recurrence, including cytologic atypia, metastases, mitotic rate, the presence of giant cells, or the finding of lymph vascular invasion [29]. Liu *et al*. [30] February 2010 to February 2017 reported 36 patients with chondroblastoma of the adjoining knee joint were identified, mean age 17 years, mean follow-up of 51.8 months, the tumor locations were: distal femur (14), patella (2), and proximal tibia (20), (1) patient relapsed, after 10 months of operation; All patients had proper bone healing, no knee varus or valgus deformity developed, the mean MSTS score was 28.6 ± 1.1, suggested that intraregional aggressive curettage and allogeneic bone grafting were successful in treating the chondroblastoma. *Fluoroscopy also can apply for talus bone chondroblastoma. In ihis procedure uses X-ray technology and contrast dye material, which makes the targeted body parts radio-opaque for easier visualization. It is also performed to assist in the insertion of implants. A fluoroscopy is expected to provide doctors with information that is otherwise impossible to obtain using other tests. This information is used to determine the right course of action in terms of treatment or to determine whether further action is necessary, in cases of monitoring procedures. It is commonly used in the diagnosis of diseases and also as an interventional procedure in the fields of orthopaedic.* Chen *et al*. [31] reported retrospective analysis of 25 CB patients (15 male, 10 female) consecutive patients treated with RFA from September 2006 to December 2013, 88 % of patients became asymptomatic during the follow-up period, 3(12%) patients recurrence, MSTS average score of 97.5 %, Mean follow up for the study group was 49 months, mean age was 14 years (range 9-18 years); tumors were located at the proximal tibia (8 cases), proximal femur (7 cases), proximal humerus (4 cases), distal femur (3 cases), distal tibia (1 case), distal radius (1 case), and talus (1 case), the size of the lesions presented an average diameter of 2.0 cm. Authors recommend a multidisciplinary approach, and RFA should be considered as a first-line treatment. RFA has become a routine treatment for osteoid osteoma, and it is increasingly used for the palliation of painful bone metastases [32–34]. In recent years, a series of reports on selected cases of chondroblastoma treated by RFA have shown positive results mostly in the short term [35-39]. Due to the rarity of the condition and the recent introduction of this technique, there is limited evidence on the long-term outcomes following this procedure. The reported recurrence rate in surgically treated patients can be up to 20%. Curettage has the risk of damaging the articular cartilage or the growth plate, which may result in early-onset osteoarthritis or growth disturbance, respectively [40, 2]. So, consequently, this makes RFA in the treatment of chondroblastoma a potentially attractive alternative first-line treatment. The risk of recurrence could be decreased by bone grafting and cryotherapy after surgical curettage. Overall functional outcomes, mostly cases after surgery was satisfactory, although the patients treated with tumor resection had a higher complication rate. Because probably the benign nature of chondroblastoma. Basic clinical information is summarized of all 11 published literature in *Table 1*.

Table 1: Chondroblastoma clinical features, procedures & outcomes summaries from different literatures.

Author Name	Cases	Age (years)	Curettage	Bone Graft	Male: Female	MSTS Score %	Follow-up years	Recurrence
Dahlin [8]	125	5-25 (90%)	Combine curettage+grafting 51		2:1	91	Mean, 10	22(17.6%)
Davila[10]	25	Mean 23	All combine curettage+grafting		2.6:1	Null	4	Null
Jiang [11]	18	>25 (55.6%)	Null	Null	2.6:1	93	5	0
Suneja [19]	53	Mean male 17.8, female 18.2	53	-	3:1	94.2	2.5-27	7(13.2%)
Lehner [20]	24	Mean 17.4	All combine curettage+grafting		2:1	28-30	Mean, 8	1(4.2%)
Brett [3]	42	Mean 25.5	Null	Null	5:1	80	2	10-38%
Mashhour [21]	14	Mean 17.3	All combine curettage+grafting		2.5:1	92.7	4	7.1%
Hairong [23]	199	Mean 18	Combine curettage+grafting 119		2.7:1	Mean, 29.4	5.17	5%(curettage), 0% (en-bloc)
Onur [24]	11	Mean 21	Combine curettage+grafting 8		4.5:1	Mean, 21	6.1	27%
Liu [30]	36	Mean 17	All combine curettage+grafting		2:1	Mean 28.6±1.1	4.31	2.7%
Cheng [31]	25	Mean 14	Null	Null	1.5:1	97.5	4	3 (12%)

Note: Null = not found.

CONCLUSION

We present a review of the literature detailing their occurrence and treatment. Based on successful cases the mentioned by authors' published literatures and our experience, we prefer resection, curettage, and bone grafting. The incidence of CB is low with clinical manifestations, and imaging presentation lacks specificity. *Treatment should be based on patient physical conditions and disease.* An appropriate surgical procedure was selected to remove the lesion thoroughly and reduce the complication of this incidence, thereby improving prognosis and quality of life.

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2. ***Ethical Approval*:** Hospital ethical committee and patient approved this manuscript for publication.
3. ***Source of funding:*** Not applicable.
4. ***Abbreviations:*** Not applicable.
5. ***Authors' contributions:*** SJ, SAJ, and SAM design the manuscript; SAM conducted follow-up procedures; SJ gives instructions, and ZZ revised the manuscript; SAJ and SAM write different parts; ZZ edit this manuscript; SAJ drafts the manuscript. All authors approved the final manuscript.
6. ***Statement of Informed Consent:*** Research-informed consent was obtained from per institutional protocol.
7. ***Statement of Human and Animal Rights:*** The ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 and 2008 were followed accordingly.

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