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Research Article

ROLE OF POLIDOCANOL IN PERCUTANEOUS SCLEROTHERAPY IN TREATMENT OF ANEURYSMAL BONE CYST – A SINGLE-CENTER STUDY

PAVAN KUMAR BABU[1], SUJIN S[2]*, AJAY RAIDU G[2], UMA SHANKAR[2]

[1]Department of Government General Health Hospital, Kurnool, Andhra Pradesh, India. [2]Department of , Kurnool Medical College, Kurnool, Andhra Pradesh, India.
*Corresponding author: Sujin S; Email: sujincsv@gmail.com

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ABSTRACT

Objectives: To study the clinical and radiological outcomes in patients treated with 3% polidocanol as a sclerosing agent in percutaneous sclerotherapy for aneurysmal bone cyst (ABC).

Methods: This is a single-centered retrospective study conducted in the Department of Orthopaedics at Kurnool Medical College with 23 patients from 2018 to 2021 over 3 years, where 3% polidocanol was used as a sclerosing agent in percutaneous sclerotherapy as a treatment option for ABC. Postoperatively, patients are evaluated based on clinical and radiological examinations.

Results: Clinically, patients were compared to their own Visual Analog Score (VAS) at the time of healing to the VAS score during their first visit. The mean VAS during the first visit was 7.6. At the time of healing, there were only two patients who scored a score of 1 on the VAS. Radiologically, plain radiographs were observed for ossification. 20 (86.9%) patients achieved complete ossification, 2 (8.69%) patients could achieve partial ossification.

Conclusion: With this study, we would like to present that percutaneous sclerotherapy with 3% polidocanol is effective both clinically and radiologically in the treatment of ABCs. Our institution has adopted sclerotherapy as part of salvage therapy and as the first line of treatment in treating ABC tumors.

Keywords: Aneurysmal Bone Cyst (ABC), 3% Polidocanol, Percutaneous Sclerotherapy, VAS (Visual Analog Sore)

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INTRODUCTION

Aneurysmal bone cyst (ABC) is a rare cystic lesion that is benign. ABC is mainly found at the eccentric location of the metaphysis of long bones [1]. ABC constitutes 1% of all benign bone tumors. ABC is expansile, highly vascular, and osteolytic in character. ABC is either latent or active; the uncommonly aggressive variant is seen. One must try to rule out aggressive variants of telangiectatic osteosarcoma. There is not much of a sex predilection in patients diagnosed with ABC. Populations belonging to the 1st and 2nd decades are vulnerable to ABC. Symptoms include pain and swelling. A pathological fracture was seen in some patients. Fluid–fluid levels and soft-tissue extension are indications of ABC in magnetic resonance imaging (MRI). A biopsy stands out as the gold standard of investigation. Curettage with bone grafting (auto-graft or allograft) is considered the mainstay of treatment for ABC. Curettage and bone grafting showed high rates of morbidity as well as recurrence [2]. Other advanced treatment modalities include radiotherapy, wide excision, and sclerotherapy [3,4]. The sclerosing agent damages endothelial vessels, thus initiating a coagulation cascade leading to a thrombus in the feeding vessels that supply ABC [5]. In our retrospective study, we studied clinical and radiological outcomes in patients suffering from ABCs who were treated with 3% polidocanol as a sclerosing agent in percutaneous sclerotherapy presented to our hospital for the past 3 years.

METHODS

The study was conducted at a single center. The survey carried out is a retrospective study. Patients with ABC were treated with 3% polidocanol (as a sclerosing agent) for percutaneous sclerotherapy during the period 2018–2021. This study was approved by the Institutional Ethical Committee (IEC-KMC-GGH, dated August 28, 2019). Informed and written consent were obtained from all the participants. Data were taken from electronic medical records. The study included 23 patients, of whom 13 were male and 11 were female. Data collected include age, sex, location of the cyst, size of the cyst, number of injections given, healing, follow-up period, recurrence rate, side effects, and complications. Investigations include radiographs, magnetic resonance imaging, and histopathological examination. Consent from patients and attendees for sclerotherapy was obtained after explaining the diagnosis, treatment options, side effects, and possible outcomes. Inclusion criteria include patients diagnosed based on both radiological and histopathological evidence as ABC and those treated with 3% polidocanol as a sclerosing agent. Exclusion criteria exclude patients who were treated with any other sclerosing agent rather than polidocanol, the patients with ABC who have undergone any other treatment modality except sclerotherapy with 3% polidocanol. Under fluoroscopic guidance and anesthesia, a trocar was introduced into the cyst. Using a trocar, the septa of the cyst were broken, making the cyst a single structure without a septa, which was aspirated. 3% polidocanol (2–4 mg/kg body weight) is given through the trocar [6]. The process was repeated every 6–8 weeks, depending on the ossification of the cyst as seen on radiographs taken subsequently.

RESULTS

In this study, the mean age of the patients was 13.5 years (3–30). Male patients were 12, and females were 11. Patients were followed up for 3–36 months, with the mean follow-up period being 21.69 months. Ten patients required two or <2 injections, whereas the other 13 took more than two injections to achieve healing. The mean number of injections given is 2.82, with a patient receiving a maximum of six injections. There is a significant decrease in the Visual Analog Score (VAS) at the time of healing compared to the VAS at the time of the initial visit to the hospital. The mean VAS before starting the treatment was 7.6, whereas only two patients recorded a VAS of 1 at the time of healing.

Table 1: Master chart

S. No.	Age (years)	Sex	Location	Size (cm)	Number of injections	Ossification	Follow-up (months)	VAS (at presentation)	VAS (at last follow-up)
1	11	Male	Proximal tibia	2	4	Complete	31	7	0
2	13	Female	Distal tibia	2	2	Complete	24	8	0
3	9	Male	Ischium	4	4	Complete	16	9	0
4	12	Male	Acetabulum	6	4	Complete	36	6	0
5	10	Male	Distal fibula	1	1	Complete	20	9	0
6	17	Female	Distal femur	3	1	Partial	9	5	0
7	10	Male	Proximal femur	3	3	Complete	26	7	0
8	30	Female	Proximal tibia	4	3	Complete	24	8	0
9	12	Male	Proximal femur	4	2	Complete	29	10	0
10	3	Male	Distal tibia	1	1	Complete	9	10	1
11	15	Male	Ischium	2	2	Complete	7	8	0
12	26	Female	Calcaneum	4	3	Complete	32	7	0
13	12	Male	Distal ulna	2	2	Complete	34	5	0
14	13	Female	Clavicle	2	1	Partial	5	7	0
15	4	Male	Distal fibula	3	3	Complete	14	6	0
16	20	Female	Distal radius	3	6	Complete	30	8	0
17	11	Female	Humerus head	2	3	Complete	32	10	0
18	11	Female	2nd metatarsal	1	1	Complete	3	8	0
19	10	Male	Ischium	3	6	Partial	29	9	1
20	17	Female	3rd metatarsal	3	1	Complete	6	9	0
21	13	Female	Iliac wing	3	4	Complete	34	7	0
22	20	Male	Proximal fibula	2	5	Complete	30	6	0
23	12	Female	Distal tibia	3	3	Complete	19	6	0

VAS: Visual Analog Score

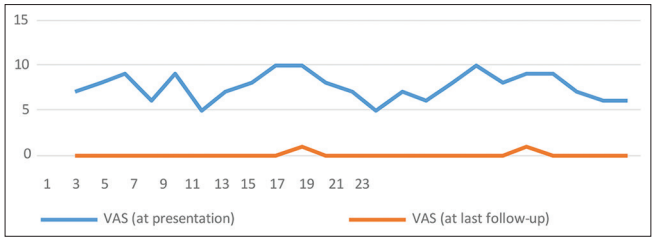

Fig. 1: Comparison of pain before and after sclerotherapy

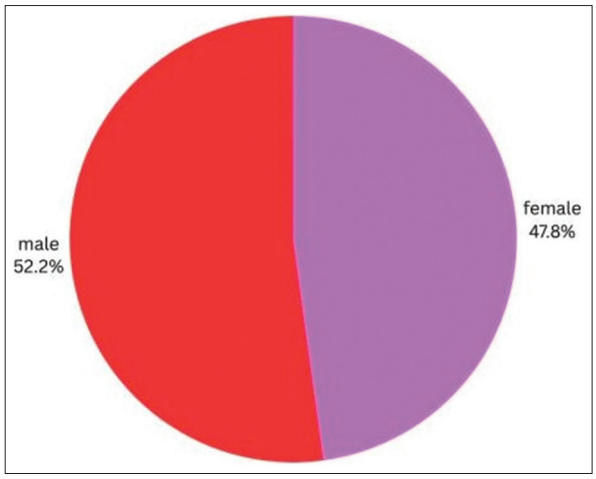

Fig. 2: Incidence

Sclerotherapy with 3% polidocanol showed excellent results; out of 23 patients, 20 showed complete ossification on plain radiographs, and the remaining 3 showed signs of partial healing on plain radiographs. One patient lost follow-up, whereas two patients with partial healing were further treated with curettage and bone grafting and then showed signs of healing. In two cases where recurrence was seen, the tumor resolved with subsequent sclerotherapy. One patient suffered an adverse inflammatory reaction, and another patient presented with pigmentation at the site of injection. Symptomatic treatment was given

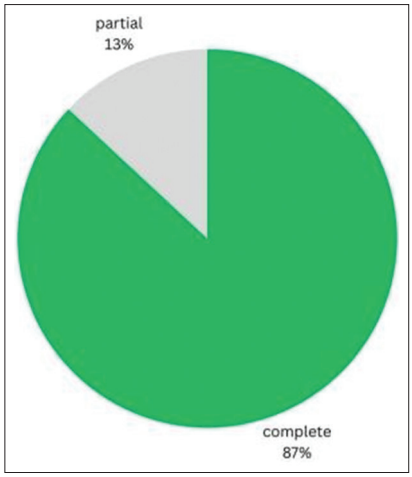

Fig. 3: Radiological healing

for both of them. Adverse effects such as growth arrest, limb shortening, and sclerosing agent embolism are not seen on follow-up.

DISCUSSION

Curettage with bone grafting is one of the most common methods of treatment for ABC, but it comes with the disadvantage of an increased risk of morbidity and recurrence. Other treatment modalities include arterial embolization, wide excision of the cyst, and radiation therapy [5,7-9,18]. Here, we studied the role of sclerotherapy with 3% polidocanol in treating ABC. Healing is scaled based on a clinical and radiological basis [10-12]. Clinically, pain was scored with the help of VAS. Radiologically, ossification on plain radiographs was identified. Sclerotherapy has a treatment response rate of up to 86%, with the remaining 14% of patients experiencing a significant decrease in VAS. Healing rates were on par with other equivalent studies. Patients on follow-up were advised to take plain radiographs and MRIs. On MRI, which is more sensitive than plain radiographs, reduced fluid levels are achieved. On plain radiographs, ossification of the cyst is achieved in most patients. Several other agents are also used as sclerosing agents for treating ABC, such as ethanol and doxycycline [13,14]. Other studies

have revealed that polidocanol has been efficient with fewer side effects compared to other sclerosing agents. Polidocanol can also be used to treat varicose veins, esophageal varices, vascular malformations, and telangiectasias. The advantage of sclerotherapy is that it requires less hospital stay for a single injection and can thus be done as a day-care procedure. Sclerotherapy is a minimally invasive procedure with very minimal blood loss; the risk of scar formation is less; and there is a decreased risk of morbidity. Surgically challenging locations such as the ischium and the spine can be managed with sclerotherapy with minimal neurovascular damage, thus reducing the chances of ischemia [15]. The disadvantages of sclerotherapy include multiple injections and multiple visits to the hospital. An increased number of injections results in the repeated induction of anesthesia. Radiation therapy carries a risk of secondary malignancies, mainly in younger age groups [16]. Newer modalities for treating ABC include the use of monoclonal antibodies and bisphosphonates. Denosumab, a newer monoclonal antibody, is used to decrease the osteolytic activity in cysts. Side effects, such as an alteration of calcium levels in the patient, were observed with denosumab. Bisphosphonates such as zolendronate decrease the osteolytic process in the cyst, thus promoting ossification. The study suggests that the non-invasive treatment with 3% polidocanol is effective in aggressive ABCs with fewer side effects and shorter hospital stays.

Limitations of the study

The study was retrospective with a limited follow-up period. Radiographs and MRIs are read by different radiologists. There was no control group to compare against the study sample of patients selected. A multicentric randomized control trial would give more information on the long-standing effects of sclerotherapy in the treatment of ABC.

CONCLUSION

With this study, we want to demonstrate that percutaneous sclerotherapy with 3% polidocanol is clinically and radiologically successful in treating ABCs. Polidocanol is effective in treating aggressive ABC cancers. Sclerotherapy can be considered a minimally invasive surgery with few adverse effects. Sclerotherapy is being used as a salvage therapy and the first line of treatment for ABC malignancies at our institution.

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AUTHOR'S CONTRIBUTION

All authors participated in every aspect of the study, including conceptualization, design, data collection, data analysis, interpretation, manuscript preparation, critical review, and approval of the final version to be published.

CONFLICT OF INTEREST

The authors have confirmed that they have no conflicts of interest related to this research, authorship, or publication of this article.

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REFERENCES

1. MRI of bone and soft tissue tumors and tumorlike lesions. Differential diagnosis and atlas. AJNR Am J Neuroradiol. 2009 Jan;30(1):e16. doi: 10.3174/ajnr.A1149. PMCID: PMC7051742
2. Grahneis F, Klein A, Baur-Melnyk A, Knösel T, Birkenmaier C, Jansson V, *et al*. Aneurysmal bone cyst: A review of 65 patients. J Bone Oncol. 2019 Aug 6;18:100255. doi: 10.1016/j.jbo.2019.100255. PMID: 31463187; PMCID: PMC6706632
3. Deventer N, Deventer N, Gosheger G, de Vaal M, Vogt B, Budny T. Current strategies for the treatment of solitary and aneurysmal bone cysts: A review of the literature. J Bone Oncol. 2021 Jul 20;30:100384. doi: 10.1016/j.jbo.2021.100384
4. Rossi G, Mavrogenis AF, Papagelopoulos PJ, Rimondi E, Ruggieri P. Successful treatment of aggressive aneurysmal bone cyst of the pelvis with serial embolization. Orthopedics. 2021;35(6):e963-8. doi: 10.3928/01477447-20120525-43
5. Rastogi S, Varshney MK, Trikha V, Khan SA, Choudhury B, Safaya R. Treatment of aneurysmal bone cysts with percutaneous sclerotherapy using polidocanol. A review of 72 cases with long-term follow-up. J Bone Joint Surg Br. 2006 Sep;88(9):1212-6. doi: 10.1302/0301-620X.88B9.17829. PMID: 16943475
6. Brosjö O, Pechon P, Hesla A, Tsagozis P, Bauer H. Sclerotherapy with polidocanol for treatment of aneurysmal bone cysts. Acta Orthop. 2013 Oct;84(5):502-5. doi: 10.3109/17453674.2013.850013. PMID: 24171682; PMCID: PMC3822137
7. Marcove RC, Sheth DS, Takemoto S, Healey JH. The treatment of aneurysmal bone cyst. Clin Orthop Relat Res. 1995 Feb;(311):157-63. PMID: 7634571
8. Jain R, Bandhu S, Sawhney S, Mittal R. Sonographically guided percutaneous sclerosis using 1% polidocanol to treat vascular malformations. J Clin Ultrasound. 2002 Sep;30(7):416-23. doi: 10.1002/jcu.10091. PMID: 12210459
9. Boriani S, De Iure F, Campanacci L, Gasbarrini A, Bandiera S, Biagini R, *et al*. Aneurysmal bone cyst of the mobile spine: Report on 41 cases. Spine (Phila Pa 1976). 2001 Jan 1;26(1):27-35. doi: 10.1097/00007632-200101010-00007. PMID: 11148642
10. Puri A, Hegde P, Gulia A, Parikh M. Primary aneurysmal bone cysts. Bone Joint J. 2020 Feb;102-B(2):186-90. doi: 10.1302/0301-620X.102B2.BJJ-2019-1083.R1. PMID: 32009434
11. Puthoor D, Francis L, Ismail R. Is sclerotherapy with polidocanol a better treatment option for aneurysmal bone cyst compared to conventional curettage and bone grafting? J Orthop. 2021 May 21;25:265-70. doi: 10.1016/j.jor.2021.05.020
12. Jasper J, van der Heijden L, van Rijswijk CS, van de Sande MA. Efficacy of sclerotherapy with polidocanol (ethoxysclerol) in primary aneurysmal bone cysts in children and adolescents. J Pediatr Orthop. 2021;41(7):e555-62. doi: 10.1097/BPO.0000000000001839
13. Ulici A, Florea DC, Carp M, Ladaru A, Tevanov I. Treatment of the aneurysmal bone cyst by percutaneous intracystic sclerotherapy using ethanol ninety-five percent in children. Int Orthop. 2018 Jun;42(6):1413-9. doi: 10.1007/s00264-018-3841-y. PMID: 29492610
14. Shiels WE 2nd, Beebe AC, Mayerson JL. Percutaneous doxycycline treatment of juxtaphyseal aneurysmal bone cysts. J Pediatr Orthop. 2016;36(2):205-12. doi: 10.1097/BPO.0000000000000413
15. Terzi S, Gasbarrini A, Fuiano M, Brodano GB, Ghermandi R, Bandiera S, *et al*. Efficacy and safety of selective arterial embolization in the treatment of aneurysmal bone cyst of the mobile spine: A retrospective observational study. Spine (Phila Pa 1976). 2017 Aug 1;42(15):1130-8. doi: 10.1097/BRS.0000000000002017. PMID: 28009753
16. Meyers PA, Heller G, Healey J, Huvos A, Lane J, Marcove R, *et al*. Chemotherapy for nonmetastatic osteogenic sarcoma: The Memorial Sloan-Kettering experience. J Clin Oncol. 1992 Jan;10(1):5-15. doi: 10.1200/JCO.1992.10.1.5. PMID: 1370176