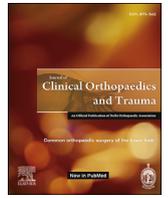




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Editorial

Giant cell tumor of bones- An unsolved puzzle



Being one of the most frequent bone tumors presenting to the Orthopaedic Surgeons, Giant Cell Tumor of Bone (GCTB) is the prototype of benign aggressive tumors of the bones. However, an occasional case may present, somewhat unpredictably, with florid local recurrences, distant metastases, and multicentric disease reminiscent of malignancies. From the early description by Samuel Gross in 1879 and management principles by Joseph Blood goodin 1912,¹ the present-day understanding of GCTB has come a long way. However, it remains an enigma for Orthopaedic Surgeons because of an erratic clinical course and posing a radiological and pathological diagnostic dilemma. Moreover, it is expected that the surgeon would preserve maximum function in the treatment of this “benign” disease. The availability of multiple treatment options for this benign aggressive tumor only makes room for even more controversy and debate. GCTB is indeed the ‘giant’ among all the benign bone tumors, because of its unpredictable behavior and higher rates of recurrence.

In the quest to achieve the right balance between adequate local control and optimal function, extended curettage has emerged as the apparent treatment of choice for GCTB, wherever feasible. With the refinement of surgical techniques, the outcome of curettage has improved to acceptable rates of local recurrence with good functional outcomes. However, there remain many contentious issues regarding curettage for GCTB, including use of adjuvants, relative contraindications for curettage (Campanacci grade/unfavourable location/pathological fracture, etc.), the effect of surgical training and effect of Denosumab and Bisphosphonates on the outcome of curettage.

GCT of the axial skeleton is the most challenging to treat, and the options range from curettage/resection to non-operative methods such as serial Angio-embolisation, Denosumab/Bisphosphonate therapy, Radiotherapy, or a combination of one or more of these. Besides the axial skeleton, pharmacotherapy, particularly Denosumab, has also found a lot of interest in extremity GCTB in recurrent, borderline operable, and multicentric/metastatic settings.² To choose the modality best suited for a particular patient is crucial for a successful outcome, and all these techniques have had their proponents in various centres across the world.

A search for “giant cell tumor of bone” (excluding tenosynovial GCTs and studies on GCTB as part of a group of more than one pathology) on PubMed shows more than 50 publications in the first half of 2019 alone. It underlines the fact that GCT remains a hot topic with many unanswered questions. As we go through the spectrum of literature on GCTB in 2019, quite understandably, there is much interest in the assessment of response to Denosumab and Zoledronic acid on clinical,^{3–5} histopathological⁶ and radiological parameters. While Denosumab seems to be the most favourite topic, literature in 2019 also continues to look at the eternal

questions on GCTB including outcome of curettage in special situations⁷ and locations,^{8,9} use of adjuvants after curettage,¹⁰ effect of filling agent after curettage,¹¹ radiological appearance,¹² and malignancy in GCTB.¹³

This special issue on GCTB carries an exciting mix of review and original articles and case reports making it an enriching update on the understanding of GCTB. Even if there have been significant strides in our understanding of GCTB, there remain the issues of identifying prognostic markers predicting clinical behaviour, minimising the risk of local recurrence in patients undergoing curettage and safe and effective treatment of inoperable giant cell tumors. Amid all the dilemmas GCTB continues to throw at Orthopaedic surgeons, Oncologists, Pathologists and Radiologists alike, we must continue to follow the evidence-based practice as it keeps evolving, making prudent use of all surgical, non-surgical and pharmacological measures available.

In addition to the articles related to GCTB, the theme of this issue, we have included some interesting review and research articles on vitamin D. Although, it is known for many decades that Vitamin D is the most essential ‘hormone’ for the health of musculoskeletal system, but its importance has come to limelight only in the last two decades or so.¹⁴ The beneficial effects of Vitamin D on the bones, joints, and muscles are well documented, by several prominent researchers, including M.F.Holick.¹⁵ We are pleased to include a review article by a leading researcher on Vitamin D, Dr. Holick and his team, in this special issue.¹⁶

References

- McCarthy EF. Giant cell tumor of bone: an historical perspective. *Clin Orthop Rel Res.* 1980;153:14–25.
- Vaishya R, Agarwal AK, Vijay V. Salvage treatment of aggressive giant cell tumor of bones with denosumab. *Cureus.* 2015 Jul 30;7(7), e291. <https://doi.org/10.7759/cureus>.
- Urakawa H, Mizusawa J, Tanaka K, et al. A randomized phase III trial of denosumab before curettage for giant cell tumor of bone: Japan Clinical Oncology Group Study JCOG1610. *Jpn J Clin Oncol.* 2019 Apr 1;49(4):379–382.
- Li S, Chen P, Yang Q. Denosumab versus zoledronic acid in cases of surgically unsalvageable giant cell tumor of bone: a randomized clinical trial. *J Bone Oncol.* 2019 Jan 23;15:100217.
- Lippmaa A, Kroepf JR, van der Heijden L, et al. Adjuvant zoledronic acid in high-risk giant cell tumor of bone: a multicenter randomized phase II trial. *The Oncologist.* 2019 Jul;24(7), 889–e421.
- Yonezawa N, Murakami H, Demura S, et al. Morphologic changes after denosumab therapy in patients with giant cell tumor of the spine: report of four cases and a review of the literature. *World Neurosurg.* 2019 Jul;127:38–46.
- Tsakamoto S, Mavrogenis AF, Tanzi P, et al. Similar local recurrence but better function with curettage versus resection for bone giant cell tumor and pathological fracture at presentation. *J Surg Oncol.* 2019 Jun;119(7):864–872.
- Qu H, Guo W, Li D, Yang Y, Wei R, Xu J. Functional results of wrist arthrodesis versus arthroplasty with proximal fibula following giant cell tumour excision of the distal radius. *J Hand Surg Eur.* 2019 May;44(4):394–401.
- Cui HM, Yu YL, He Y, Kong LZ, Fan CY. Management of elbow dysfunction associated with giant cell tumor of the distal humerus: achieving oncologic safety

- and good function by a combined reconstruction. *J Shoulder Elb Surg.* 2019 Jan;28(1):120–125.
10. Omlor GW, Lange J, Streit M, et al. Retrospective analysis of 51 intralesionally treated cases with progressed giant cell tumor of the bone: local adjuvant use of hydrogen peroxide reduces the risk for tumor recurrence. *World J Surg Oncol.* 2019 Apr 23;17(1):73.
 11. Vaishya R, Pokhrel A, Agarwal AK, Vijay V. Current status of bone cementing and bone grafting for giant cell tumour of bone: a systemic review. *Ann R Coll Surg Engl.* 2019 Feb;101(2):79–85.
 12. Nishibori H, Kato H, Kawaguchi M, Nagano A, Matsuo M. T2*-weighted MR imaging findings of giant cell tumors of bone: radiological-pathological correlation. *Jpn J Radiol.* 2019 Jun;37(6):473–480.
 13. Palmerini E, Picci P, Reichardt P, Downey G. Malignancy in giant cell tumor of bone: a review of the literature. *Technol Cancer Res Treat.* 2019 Jan 1:18.
 14. Vaishya R, Vijay V, Jahangir J, Vaish A. Resurgence of vitamin D: old wine in new bottle. *J Clin Ortho Trauma.* 2015;6(3):173–183. September.
 15. Holick MF. Vitamin D deficiency. *N Engl J Med.* 2007;357(19):1980–1982.
 16. Charoenngam N, Shirvani A, Holick MF. Vitamin D for skeletal and non-skeletal

health: what we should know. *J Clin Orthop Trauma*; 2019. <https://doi.org/10.1016/j.jcot.2019.07.004>.

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