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Original article

Wide resection versus curettage in giant cell tumor with pathological fracture? A systematic review and meta-analysis

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ABSTRACT

Introduction: Currently there is no consensus if wide resection and curettage in giant cell tumor have effect on local recurrence rate in the presence of a pathological fracture.
Material and method: We conducted a comprehensive review and meta-analysis of papers which reported outcomes in patients of giant cell tumor with and without a pathological fracture. The odds ratio (OR) of local recurrence between wide resection and curettage group in giant cell tumor with pathological fracture was calculated.
Results: 05 eligible papers were selected for final analysis. This included patients, of whom (18.0%) had a pathological fracture. The pooled OR for local recurrence between patients of pathological fracture treated with wide resection and curettage was 0.298% (95% Confidence interval (CI) 0.0669–1.329, p = 0.97).
Conclusion: Wide resection and curettage in patients of giant cell tumor with pathological fracture has difference in local recurrence rates. However the presence of a pathological fracture should no be only influential factor in the decision making to perform wide resection or curettage. A proper planning and judicious approach is required in giant cell tumor with pathological fracture for deciding the appropriate treatment method.

1. Introduction

The prevalence of pathological fractures ranges between 9% and 30% of patients with giant cell tumor (GCT) of extremities.[1–9] Pathological fracture leads to severe pain, immobilization of limb, decreased ambulation, affects activities of daily living and quality of life. Presence of a pathological fracture may lead traditionally to the local hematoma formation causing spread of tumor cells to adjacent tissue and joint contamination. Microcirculation of tumor due to the pathological fracture can lead to transfer of the tumor to distant sites and lead to distant metastasis.[1,12] The timing of pathological fracture and fracture displacement could have impact over the treatment and prognostic significance. Also there could be difference in outcomes between the patients who had a pathologic fracture on presentation and those who sustained a fracture during the period of treatment. The treatment of pathological fracture consists of immediate immobilization with a cast or a splint to avoid possibility of tumor dissemination and prevent joint contamination and reduce pain and swelling. Bone union after fracture leads to reduced pain and swelling over affected bone and extremity. Pathological fracture is considered as a prognostic factor and has treatment implications on patients with giant cell tumor.[5–10] The development of pathological fracture is often regarded as a poor prognostic factor which has been associated with higher local recurrence rate.[5–8] There is a common belief that immediate and aggressive tumor removal may impede disease progression and hence, wide resection has been advocated as the treatment for patients with a pathological fracture. GCT is peri-articular bone tumor, a strategy of wide resection may necessarily entail en bloc resection of the adjacent joint and fusion or reconstruction, with their associated morbidity and complications.[8,10,11] The recent development in implants and surgical techniques of mega-prosthesis joint replacement surgery has improved the function and rehabilitation. On the other hand joint salvage with curettage surgery as a treatment modality is beneficial for the preservation of the joint.[5,6]

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Table 1
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Human studies	Animal studies
Clearly defined clinical outcomes	Other benign and malignant tumours
	Absence of comparison groups
	Isolated case reports
	Case series with sample size <5
	Non-English

We conducted a comprehensive review and meta-analysis of papers which reported outcomes on patients with local recurrence rate between wide resection and curettage of giant cell tumor with pathological fracture.

2. Materials and methods

2.1. Search methodology and selection criteria

An extensive search of the literature with PubMed, Scopus and Cochrane Central Register of Controlled Trials database was performed for articles which reported outcomes in patients with a giant cell tumor with a pathological fracture. We identified studies for this systematic review using the following search terms: (pathological fracture) and (giant cell tumor). Search terms were broad in order to encompass all possibilities for relevant studies. We did not place any restrictions on the date of publication. The search was performed on 01 September 2016.

2.2. Data assessment and inclusion and exclusion criteria

After elimination of duplicate abstracts, two investigators independently reviewed all abstracts, and the full text of articles regarded as potentially eligible for further consideration were extracted for further analysis. We further hand-searched reference lists of relevant articles to identify further articles for analysis. Thereafter, eligible articles were selected for final analysis according to predefined inclusion and exclusion criteria. All comparative articles examining clinical outcomes in patients who had a giant cell tumor of the bone with a pathological fracture were included. The inclusion and exclusion criteria's were used for identifying the appropriate studies for the current meta-analysis. (Table 1). We independently graded the articles selected for final analysis according to the Newcastle-Ottawa scale for the assessment of the quality of non-randomised studies in meta-analyses (Table 2). The following information was extracted from included article in systematic review. The meta-analysis was performed in line with recommendations from the Cochrane Collaboration and the Quality of Reporting of Meta-analyses guidelines. The publication bias of the included studies for meta-analysis was calculated with funnel plot analysis and Egger's regression asymmetry test.[13] A p value of less than 0.05 level were considered statistically significant. The random effect model was used to estimate the odds ratio (OR) for comparing local recurrence rates between curettage and wide excision in the pathological fracture patients. All statistical analyses were performed using Medcalc 12.7 (Medcalc Software, USA).

3. Results

Using our search syntax, a total of 1236 articles were found. In total, 140 were identified from PubMed, 1096 from Proquest library and none from the Cochrane Register of Controlled Trials after the initial search. The duplicated articles were removed and 215 articles were identified using the inclusion and exclusion criteria. A total of 172 were excluded on the basis of title and review of the abstract. The full texts of the remaining 43 papers were reviewed and 38 were excluded. We finally selected 05 articles for the meta-analysis[1–5] (Fig. 1), (Table 3).

3.1. Demographic data and prevalence rate of pathological fracture

The study population consisted of a total of 643 patients, 118 (18.0%) were in pathological fracture group and 525 were in non fracture group, with a mean follow-up of 4.7 years (Table 3).

3.2. Comparison of local recurrence rates between wide resection and curettage in patients of giant cell tumor with pathological fracture

A total of 05 studies were reviewed in order to compare local recurrence rates in patients of giant cell tumor with pathological fracture who had been treated with wide resection and curettage, involving a total of 118 patients (wide resection, n = 64; curettage, n = 54). The overall pooled OR was 0.298% (CI 0.0669–1.329, p = 0.97). This indicate difference in the risk of local recurrence in the wide resection group compared to curettage group in patients of giant cell tumor with pathological fracture but this difference did not reach statistical significance (Fig. 2), (Table 4).

4. Discussion

Giant cell tumor (GCT) is a locally aggressive benign tumor and it accounts 15% of all benign tumours of the bone.[10,11] The tumor tends to affect peri-articular regions; knee, shoulder and wrist joint. Local recurrence rate of giant cell tumor ranges from 25% to 50%.[5–12] The patients with giant cell tumor develop pathological fracture in approximately 9–30% cases.[1–11] The presence of a pathological fracture is considered as a factor in decision making for treatment of giant cell tumor.

The treatment of giant cell tumor consists of curettage with adjuvant therapy or wide resection.[5–12] Curettage is an acceptable form of treatment for giant cell tumor.[14–16] Curettage performed in carefully selected patients may have a similar outcome in terms of local recurrence to those without a pathological fracture. Curettage could avoid the increased morbidity and complications associated with wide resection.[1] However curettage method and use of

Table 2
Newcastle-Ottawa Scale.

	Selection				Comparability	Outcome			Total
Study included in meta-analysis	Case Definition Adequacy	Representativeness of case	Selection of controls	Definition of controls	Comparability of cases and controls	Ascertainment of exposure	Same method of ascertainment for cases and controls	Non-respond Rate	
Xing et al.[1]	◇	◇	◇	◇	◇	◇	◇	◇	8*
Torigoe et al.[2]	◇	◇	◇	◇		◇	◇	◇	7*
Jeys et al.[3]	◇	◇	◇	◇	◇	◇	◇	◇	8*
Blackley et al.[4]	◇	◇	◇	◇		◇	◇	◇	7*
McDonald et al.[5]	◇	◇	◇	◇	◇	◇	◇	◇	8*

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