Reviewer’s report

Title: Osseous vitality in SPECT/CTs after balloon tibioplasty of the tibial plateau

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Reviewer: Antonius Pizanis

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The authors present a well written manuscript about their study on osseous vitality after tibia plateau fractures. Based on a case series of ten patients treated surgically using a recently described method (balloon tibioplasty), the primary outcome parameter consisted in judging whether or not the bone structure next to the fracture shows positive enhancement in the imaging by SPECT/CT scans, meaning viable bone areas. Further descriptive data consisting in clinical follow-up scores and osseous consolidation rates are presented as secondary parameters.

The relevant question about osseous vitality regards the depressed area of bone, which is reduced by a controlled force and is then filled by bone cement. Bone necrosis by the compression through reduction or even direct thermal/toxic influence is possible and has been reported in other environments. However, in this report no negative effects could be discerned in these areas of interest, as investigated by the modern and validated examination of SPECT. All the patients studied had all viable bone in the vicinity of the tibia plateau fracture and the cemented void filling. Appropriately, the fracture areas were found to be consolidated and the clinical scoring results were fairly good for this type of injury.

This report contains important information for surgeons as well as for radiologists and underlines the potential of modern imaging tools. The mainframe and basic message would be nice to be published, however some minor corrections should be made to enhance the value. In the following, the authors should consider these suggestions and sincere comments to elaborate this paper.

Abstract:

Line 14: correct “retrospective cohort” in the more appropriate “case series”

Line 20ff: instead “secondary outcomes…specific scores” rather “secondary parameters included the clinical and radiological follow-up data”

Line 26: complete the abbreviation “PMMA/HA” and switch it to the end of the sentence to distinguish that it is not pure PMMA. Subsequently, the abbreviation has absolutely to be adopted through the whole manuscript.

Line 36ff: under conclusions, the final phrase cannot be accepted, due to the lack of evidence. The suggestion would be “…surgeons could use PMMA/HA for void filling in elderly fracture patients without concern about the bone viability”.

Intro:
Line 49: delete “intraart. involvement in over 50%”
Line 62: instead “metallic” insert “regular instruments”. Delete “which carry…mechanical force” and replace with “which may even enlarge the void created by the imprecise reducing action [12]”.
Line 65: instead “lies” use “consists”
Line 66: instead “entails” use “means”
Line 68: end sentence after “…substitutes”, continue in capital “The procedure…”
Line 73: omit “osteoinductive”
Line 76: omit “Importantly”
Line 77ff: rephrase that to “…there are no studies about the effects of cement augmentation of tibial plateaus on bone viability, and especially not after inflatable bone tamp reduction as used in the technique of balloon tibioplasty”. 
Methods:
Line 94-96: needs to be rephrased without “cohort”, instead “series of patients” and especially not “n=16”, because this would be misleading. The main theme is about the bone viability and not the method of tibioplasty. Recognize the number of patients with deleting “n=16”.
Line 97: is problematic. SPECT/CT is definitely not a clinical routine for tibia plateau fracture diagnostics and should not be understood in that way by any reader. It is an option to assess osseous viability in the author’s center and has to be distinguished in that role, as approved by the local ethical committee. It is mandatory to rephrase this part appropriately. Also, it should become clear for every reader, that radiological imaging by plain films or CT scan at maximum is the standard for assessing the healing/consolidation of those fractures.
Line 98ff: please do not use % when groups do not include at least 100 patients, in such small groups it is more elegant to describe the accounted number / sum of patients, or else it has the character of extrapolation... E.g. delete “63%” and leave “ten”, further “Reasons for 6 absent SPECT/CTs were death” delete “(12%)” and so on.
Line 102: correct to “and exclusively described…”
Line 103ff: delete “and more importantly”, replace with “or”, delete “using SPECT/CT”.
Line 105-108: these are not “secondary outcome variables”, maybe rather “secondary outcome influencing variables”.
Line 109ff: please end the sentence after “…18 years.”, or readers could challenge the informed consent for SPECT/CT, although the physicians in the author’s hospital center had an indication for it.
Line 138: add “mixed” between “bone cement” and “hydroxyapatite”
Line 152, 159…: please remember to replace % values.
Line 169: please specify when osseous consolidation was achieved (time in months).
Discussion:
Line 177: insert “using the example of balloon tibioplasty of the knee”
Lines 179-180: delete “no matter”, use “independently of using PMMA/HA or CaP…”
Line 181: “good” instead “acceptable”
Line 199ff: correct in “our findings are in line with the experimental results…”
Line 202: delete “up to”
Line 236: correct the whole sentence to “The follow-up period was not consistent in all cases, meaning some of the patients may have missed time to reach the pre-operative state”.
Line 240: delete “exemplified”, use simply “shown” instead.
Line 243: if the authors illustrate the reason of low scores and loss of reduction with the example of a “patient with hemineglect…in wheelchair ambulation”, they should complete with the reason for implanting a total knee arthroplasty (see line 170) later on. Most probably for pain reason (?).
Line 255: “reduction” instead “reposition”
Line 260: typo error ) before “…chondral”
Line 263: complete after “postoperatively by using pure PMMA.”
Line 277: insert “viability of bone around” between “compare” and “PMMA”
Conclusions
Line 283ff: please rephrase to fit the correction mentioned for line 36 above.
Figures and table, legends:
It would be important to abbreviate the technique depicted in Figg. 3-6, since this paper is not intended to describe a new technique.
Figg. 9-10 have to be deleted, because the arthroscopic variation/option of the treatment method are not the subject and overloading the reader would confuse the message.
Please apply adequately with the legends.
That was quite a lot of suggestions I hope the authors will include in a corrected manuscript. They may consider an idea to take advantage of the scattered follow-up time points (2-37 months) by remarking and weaving in the text, that they did not observe any signs of osteonecrosis at different times during course of treatment, neither after 2 months, nor after more than 3 years.
It would be nice to see the corrected work with MINOR ESSENTIAL REVISIONS published in this journal.

Level of interest: An article of importance in its field

Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.