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eLetter regarding "Outcomes of 188 Proximal Humeral Fractures Treated with a Dedicated External Fixator with Follow-up Ranging from 2 to 12 Years"

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Dear Editor,

We read with great interest the article titled 'Outcomes of 188 proximal humeral fractures treated with a dedicated external fixator with follow-up ranging from 2 to 12 years' (1) and complement the authors for their excellent work. However, we wish to raise a few critical points:

1. The authors mention an overall good outcome for all fracture types treated with an external fixator. However, we would like to know the outcome scores in each of the fracture subtypes according to Neer's classification. It has been shown that good outcomes are seen in nearly 92% of 2-part, 80% of 3-part, and 60% of 4-part fractures in proximal humerus fractures (2). The poor results in 4 part fractures are due to the poor stability of the reconstruction with external fixator (2). We assume the authors would also have a differential outcome score for each of the subtypes, and it is worth noting the factors leading to these differential outcomes in the clinical management of these cases.

2. The authors have used the two techniques of closed percutaneous and open reduction while managing these fractures. However, the results have not been compared between the two reduction techniques. In our experience, open reduction shows better outcomes than closed or percutaneous procedures. Additionally, it would be clinically relevant to know the proportion of patients managed by each technique and then their comparative results in each fracture subtype.

3. On the same lines, the authors report a 3% reoperation rate, without the details of fracture subtype and

reduction technique used. Without a proper comparison group, it is difficult to say that for all types of proximal humerus fractures treated by external fixation gives good results. Vicenti G et al. (3) compared external fixation with plate fixation and reported no significant difference in subgroup older than 65 but favourable results with plate fixation in younger subjects. In this study pin track, infection and wire back out were significantly less one each out of 24 patients in the external fixation group.

4. The key for good functional outcomes in proximal humerus fractures is maintaining the neck-shaft alignment and reduction of both tuberosities. We would like to know the details of the surgical technique used regarding the fixation of lesser tuberosity in 4 part fractures. This is especially important to understand in the pins-bridging fracture technique.

5. It would be particularly relevant to look at postoperative computed tomography scans to assess the quality of reduction or loss of reduction. The functional outcomes would also be better understood if clinical photographs accompanied the paper.

We hope the clarification on these points would improve the interpretation of results on this excellent work by the authors. These would further help the treating orthopaedic surgeon in planning and decision-making of proximal humerus fractures.

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References

1. Blonna D, Assom M, Bellato E, et al. Outcomes of 188 proximal humeral fractures treated with a dedicated external fixator with follow-up ranging from 2 to 12 years J Bone Joint Surg Am. 2019;101:1654-61.
2. Zhang J, Ebraheim N, Lause GE. Surgical treatment of proximal humeral fracture with external fixator. J Shoulder Elbow Surg. 2012;21:882-6.
3. Vicenti G, Antonella A, Filipponi M, et al. A comparative retrospective study of locking plate fixation versus a dedicated external fixator of 3- and 4-part proximal humerus fractures: Results after 5 years. Injury. 2019;50 Suppl 2:S80-S88. doi:10.1016/j.injury.2019.01.051

Conflict of Interest: None Declared

Article Author Response

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Article Author(s) to Letter Writer(s)

Dear Editor,

We have read with interest the letter of Saini, et al. (1) about our manuscript entitled “Outcomes of 188 Proximal Humeral Fractures Treated with a Dedicated External Fixator with Follow-up Ranging from 2 to 12 Years” (2). We appreciate their interest in our paper, which gives us the chance to add some extra data that we were not allowed to include due to the word-limit imposed by the Journal.

The complexity of proximal humeral fractures is one of the factors that can affect outcomes after reduction and fixation. Outcomes stratification based on the Neer classification showed the expected differences. In our study patients with type 2 fractures had an Oxford Shoulder Score (OSS) of 43.8, a Subjective Shoulder Value (SSV) of 88.3, and a Constant Score of 75.2. Patients affected by type 3 fractures had an OSS of 42 points, an SSV of 83.4, and a Constant Score of 69.8. All differences between type 2 and type 3 were statistically significant ($p<0.05$, t-Student test). The comparison between type 3 and type 4 did not show any significant differences. Patients with type 4 fractures had an OSS of 39.5 ($p= 0.11$), a SSV of 78.3 ($p=0.14$) and a CS of 67.3 ($p=0.46$).

The difference in outcomes between type 2 and type 3-to-4 proximal humeral fractures can be justified by several factors and is largely reported in the literature. The external fixator (as with other tools) cannot overcome all the difficulties in treating complex fractures. Having said that, it is worth noting that patients with type 4 proximal humeral fractures had a SSV of 78. This means that these patients, at their last follow-up, felt like the operated shoulder was overall not normal, but similar to the contralateral one. Also, more complex fractures are associated with higher rates of complication. In terms of complication rate, it should be noted that that among the 6 out of 235 patients that required a second unplanned surgery, 5 had had a Neer type 3 or 4 fracture and only one patient had a type 2 fracture.

Since our study covers more than 10 years of experience with the use of the external fixator, the surgical technique evolved over the years. The introduction of the “Pins-bridging-technique” overcame some of the difficulties we encountered with the original technique, including the difficulties in teaching. The type of reduction, either open or closed, relied on the type of fracture and, generally speaking, did not change significantly over the years. Closed reduction is indicated for more simple fractures, while for more complex fractures usually an open reduction is suggested from the beginning or after an unsuccessful

attempt of closed reduction. As a consequence, in our experience, patients treated with open reduction obtained suboptimal outcomes compared to those who underwent closed reduction since they were affected by more complex fractures.

Table I shows the outcomes stratified according to the type of reduction. As expected patients treated with closed reduction had better outcomes.

Table I

		SSV	OSS	
n= 188	Closed reduction n=120	87.8	43.5	
	p (t test)	0.003	0.03	
	Open reduction n=68	79.87	41.1	

In Table II results are stratified according to the type of fracture and the type of reduction. The differences between the groups are not statistically significant. This hoghlights that similar good outcomes can be expected regardless of the reduction technique if the type of fracture is similar and the surgeon can obtain a satisfactory reduction.

		2 part		3 part		4 part	
n= 188	Closed reduction n=120	70		38		12	
		SSV	OSS	SSV	OSS	SSV	OSS
		90.6	44.7	83.9	42.1	85	41.5
	p (t test)	*0.56*	*0.13*	*0.27*	*0.37*	*0.23*	*0.09*
	Open reduction n=68	11		22		35	
		SSV	OSS	SSV	OSS	SSV	OSS
		81.1	43.3	87.2	43.8	74.2	38.4

Regarding the details of the surgical technique as well as pictures of the range of motion of some selected patients, the more exhaustive tool would be a video. We have done a big effort over the recent years to produce videos to share our technique (3,4,5) that helps answer most of the questions.

References

1. Saini UC, Kumar K. Eletter regarding “Outcomes of 188 Proximal Humeral Fractures Treated with a Dedicated External Fixator with Follow-up Ranging from 2 to 12 Years". May 14, 2020
2. Blonna D, Assom M, Bellato E, Pisanu G, Greco V, Marmotti A, Rossi R. Outcomes of 188 Proximal Humeral Fractures Treated with a Dedicated External Fixator with Follow-up Ranging from 2 to 12 Years. J Bone Joint Surg Am. 2019 Sep 18;101(18):1654-1661
3. Blonna D, Caranzano F, Bellato E, Rossi R, Castoldi F, Assom M. Closed reduction and external fixation of proximal humeral fractures. Rationale and surgical technique. JAAOS. 2017;25(12): 829
4. Blonna D, Caranzano F, Bellato E, Rossi R, Castoldi F, Assom M. Closed reduction and external fixation of proximal humeral fractures. Rationale and surgical technique. VIDEO. AAOS, San Diego (CA-USA), Mar 14-18, 2017
5. Blonna D, Assom M. A dedicated external fixator – Rationale, technique and results. VuMedi, 2016