Reviewer's comment concerning "Aneurysmal bone cysts of the spine" (doi:10.1007/s00586-012-2510-x by M. Zileli et al.)

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This is an excellent report of 18 cases of aneurysmal bone cyst (ABC) treated in a major center by very experienced surgeons who applied the most technically demanding procedures to treat at best these lesions. The AA report a high recurrence rate (28 %) notwithstanding a very aggressive attitude. This figure should arise a question regarding the possibility to improve the outcome, maybe also trying to reduce the aggressiveness as a side target.

A similar critical analysis was performed in my group in 2004 after some unsuccessful cases, particularly, after a case recurrent three times after very aggressive surgery and solved only by radiotherapy, eventually resulting in a secondary leukemia.

The conclusion was a complete different approach to ABC, starting from the consideration that ABC is a benign condition, sometimes self limiting [1], mostly considered as a pseudotumoral hyper/dysplastic disease rather than a neoplastic disease [2, 3], as also the AA of this article correctly remind at the beginning of the introduction. In this perspective, we started to treat ABC not like a tumor but as a dysplasia. According to a growing experience reported in the literature [4–17], all the following cases were therefore submitted only to selective arterial embolization (SAE), repeating the procedure after 6–8 weeks until the healing of the disease. Pathological fracture or cord symptomatic compression was considered a contra-indication, while crossover to surgery had to be considered in case of persistent pain and neurological deterioration. Since that time

20 cases have been till now included in the study (a report on the first seven treated from 2004 to 2009 has been recently submitted for publication). Eighteen of these evolved to complete healing, two are undergoing treatment, only one required fixation of a pathologic fracture. All cases were submitted to CT scan and MRI before all SAE and this allowed to follow the evolution: the ABC progressively shrinks, reducing its volume, while a thin sclerotic border arises and completely surrounds the mass and progressively becomes thicker. The double content disappears and is gradually followed by bone formation (Fig. 1). As a technical detail, embolization should be performed by particles till the deeper arteries feeding the ABC and not at the periphery. In all cases, pain, when present, disappeared or significantly reduces since the first SAE, and no complication occurred. However the number of SAE required (1–7) has to be considered, remarking the exposition to radiation for angiographies and for following the evolution to healing. This must be discussed with the patient in the decision making process versus the morbidity and the recurrence risks of surgery.

In my opinion SAE should be considered the standard of care of ABC (unless pathologic fracture of severely increasing neurological deterioration is detected) or at least the first option, while aggressive surgery should be abandoned as both morbidity and recurrence rate is higher.

I would conclude remarking that this otherwise excellent paper is burdened by a contradiction: while defining ABC as a tumor-like disease, the AA propose a very aggressive surgery, the same as usually performed in the treatment of aggressive benign or malignant tumors. A better critical analysis of the unsatisfying results (28 % recurrence rate) should bring to the same attitude we selected in our center after the process of self-criticism of our own results, similarly unsatisfactory.

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◀ **Fig. 1** Typical evolution of ABC after repeated SAE. **a** D'E. G., 41 years., severe pain (VAS 8) as a belt around the chest and lower limbs weakness. T5 and T6 involvement by ABC, **b** 2 months after first SAE (by particles). Pain immediately reduced to VAS 2 after the SAE. Gradual recover of the muscular strength. Imaging at 2 months: ABC shrinking, reduced double level, initial sclerotic border formation, **c** 1 month later. No pain and normal muscular strength. No double content in the ABC. Volume still reducing, **d** MR one year after diagnosis. Seven SAE performed. No pain, normal activities, **e** CT scan performed few days later. Clear imaging of bone formation filling the ABC and almost complete bone remodeling

Conflict of interest None.

References

1. Malghem J, Maldague B, Esselinckx W, Noel H, De Nayer P, Vincent A (1989) Spontaneous healing of aneurysmal bone cysts. A report of three cases. *J Bone Joint Surg Br* 71(4):645–650
2. Unni K (1996) Conditions that commonly stimulate primary neoplasms of bone. In: Unni K (ed) *Dahlin's bone tumors: general aspects and data on 11,087 Cases*. Lippincott-Raven, Philadelphia, pp 382–390
3. Enneking WF (1983) *Musculoskeletal tumor Surgery*. Churchill Livingstone, New York, pp 1513–1540
4. De Cristofaro R, Biagini R, Boriani S et al (1992) Selective arterial embolization in the treatment of aneurysmal bone cysts and angioma. *Skeletal Radiol* 21:523–527
5. DeRosa GP, Graziano GP, Scott J (1990) Arterial embolization of aneurysmal bone cyst of the lumbar spine. *J Bone Joint Surg [Am]* 72:777–780
6. Green JA, Bellemore MC, Marsden FW (1997) Embolization in the treatment of aneurysmal bone cysts. *J Pediatr Orthop* 17: 440–443
7. Cory DA, Fritsch SA, Cohen MD et al (1989) Aneurysmal bone cysts: imaging findings and embolotherapy. *Am J Radiol* 153:369–373
8. Misasi N, Cigala F, Cozzolino F et al (1982) Selective arterial embolisation in aneurysmal bone cysts. *Int Orthop* 6:123–128
9. Dick HM, Bigliani LU, Michelsen WJ et al (1979) Adjuvant arterial embolization in the treatment of benign primary bone tumors in children. *Clin Orthop* 139:133–141
10. Murphy WA, Strecker WB, Schoenecker PL (1982) Transcatheter embolization therapy of an ischial aneurysmal bone cyst. *J Bone Joint Surg [Br]* 64:166–168
11. Cisneros AJ, Gomez CH, Benedicto FC et al (1985) Aneurysmal bone cyst of the ischium. *Int Orthop* 9:49–54
12. Dysart SH, Swengel RM, van Dam BE (1992) Aneurysmal bone cyst of a thoracic vertebra. Treatment by selective arterial embolization and excision. *Spine* 17:846–848
13. Koci TM, Mehlinger CM, Yamagata N et al (1995) Aneurysmal bone cyst of the thoracic spine: evolution after particulate embolization. *Am J Neuroradiol* 16:857–860
14. Mohit AA, Eskridge J, Ellenbogen R (2004) Aneurysmal bone cyst of the atlas: successful treatment through selective arterial embolization: case report. *Neurosurgery* 55:982
15. Marushima A, Matsumaru Y, Suzuki K et al (2009) Selective arterial embolization with n-Butyl cyanoacrylate in the treatment of Aneurysmal bone cyst of the thoracic vertebra—a case report. *Spine* 34:E230–E234
16. Garg S, Metha S, Dormans JP (2005) Modern surgical treatment of primary aneurysmal bone cyst of the spine in children and adolescents. *J Pediatr Orthop* 25:387–392
17. Cigala F, Sadile F (1996) Arterial embolization of aneurysmal bone cysts in children. *Bull Hosp Jt Dis* 54:261–264