Doxycycline injection treatment for unicameral bone cysts: A case series

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Introduction/Significance

- The unicameral bone cyst (UBC) is a benign bone lesion often occurring in the metaphysis of long bones or within the axial skeleton
- UBC consists of fluid-filled cavities that can enlarge over time thinning the surrounding bone, and cause significant morbidity as a result of pathologic fracture
- Of all UBCs, 85% occur in childhood and adolescence, with a peak between 3 and 14 years of age with a mean age of diagnosis of 9 years.
- Our case series identifies a new potential treatment option for UBCs consisting of an intralesional doxycycline injection.

Design & Procedures

- Case series
- Five patients were identified as candidates for intralesional doxycycline injections.
- These subjects had complex or refractory UBCs.
- Patients typically required two rounds of doxycycline injection separated by ~2 months.
- Doxycycline (10mg/mL) was used as the chemical ablation agent and delivered as a protein foam, a mixture of doxycycline and 25% albumin agitated with air to create the stable protein foam delivery system.
- A total of 150 mg and 300 mg of doxycycline was injected during the first and second rounds.
- The injections were delivered under CT guidance.

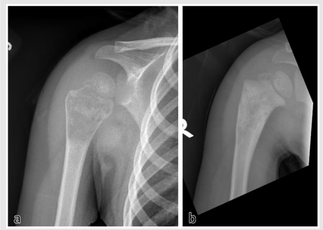

Fig 1. Humeral radiographs demonstrating consolidation of a lucent, expansile UBC performed at time points: **a.** 1 month prior to the first injection **b.** 1 month after the second injection

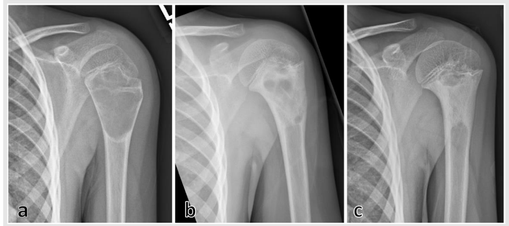

Fig 2. Humeral radiographs of UBC **a.** 4 weeks after initial presentation (healed fracture line evident) **b.** 1.5 months after the first injection **c.** 9 months after the second injection

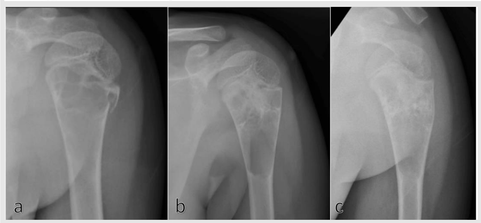

Fig 3. Humeral radiographs. **a.** first presentation with fracture **b.** 1 month prior to the first injection with mature fracture callus **c.** 2 months after the second injection with increased cortical thickening and ossification.

Fig 4. Pelvic radiographs of UBC: **a.** 6 months prior to first injection at initial presentation, **b**. 2 months prior to injections **c**. 2 months after third doxycycline injection

Fig 5. Wrist radiographs of UBC: **a.** 5 months prior to first injection **b.** 2 months after first injection **c.** 2 months after second injection **d.** 9 months after second injection

Results

Patient #1 (Figure 1)

- 3-year-old male with a history of right arm pain presented after a fall
- Radiographs + biopsy confirmed UBC
- After two injections, he was asymptomatic and had resumed normal activity
- Repeat radiography showed resolution of UBC with ossification and remodeling

Patient #2 (Figure 2)

- 9-year-old male presented with atraumatic left shoulder pain.
- Radiographs + biopsy confirmed UBC
- After two injections, radiographs showed progressive resolution of UBC with ossification and decreasing expansion

Patient #3 (Figure 3)

- 10-year-old male presented with pathologic fracture of left proximal humerus
- After two injections, he had normal use of arm without pain and radiographs demonstrated increased consolidation of UBC with increased cortical thickness.

Patient #4 (Figure 4)

- 12-year-old female presented with right hip pain after a fall.
- Imaging confirmed UBC without evidence of pathological fracture.
- After months of hip pain, the patient's parents elected for doxycycline injections
- Following three injections, remodeling and ossification was demonstrated.
- Full return to activity after the second injection.

Patient #5 (Figure 5)

- 7-year-old female presented with recurrent fractures of right distal radius
- Radiography revealed an expansile lytic lesion with a fracture through a UBC.
- After two injections, there was cortical remodeling and ossification of UBC.
- At follow-up, she was asymptomatic.

Conclusion

- This case series demonstrates five examples of the successful short-term treatment of UBCs using CT-guided intralesional doxycycline injections.
- To date, this treatment option has not been evaluated for UBCs. There were no adverse reactions reported apart from mild post-procedural discomfort.
- Broader use of doxycycline should be studied in the treatment of UBCs.