ASSESSING THE CLINICAL UTILITY OF BENDABLE OSTEOCHONDRAL ALLOGRAFTS FOR PATELLAR RESURFACING IN DOGS

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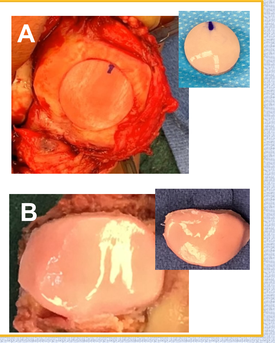
Background

- Patella-trochlear disorders are common in dogs with some cases indicated for articular resurfacing. Osteochondral allografts (OCAs) have been used successfully for biologic joint resurfacing treatments.
- Two techniques for OCA transplantation are currently in use: Plug (A) & Shell (B)
- There are still significant limitations with respect to donor-recipient size and geometry for canine and human patients, especially for patella resurfacing.
- To address these limitations, a novel bendable osteochondral allograft (BOCA), made by machining linear grooves into the subchondral bone of a shell graft, was designed and validated biomechanically prior to preclinical study.

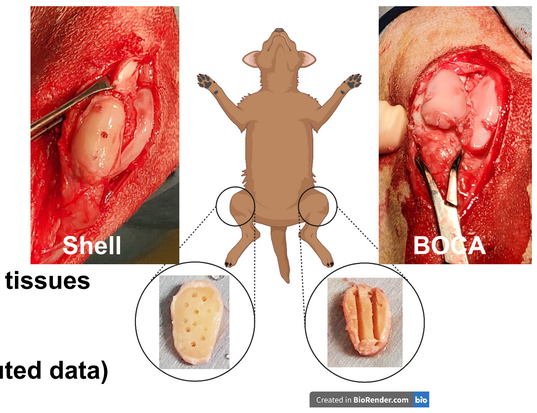


Objective & Hypothesis

- Perform preclinical assessments of patellar BOCAs using a translational animal model study
- Patellar BOCAs can be recovered, machined, stored, shipped, and transplanted so as to maintain asepsis and essential chondrocyte viability such that they effectively integrate into recipient bone and maintain joint function at levels that are not significantly different from traditional shell OCAs.

Methods

- Skeletally mature purpose bred hounds (n=5), not size matched to donor dogs (n=5), were evaluated preoperatively
- Each subject received bilateral complete patellar resurfacing using MOPS® preserved OCAs: BOCA vs Shell
- Remnant patellar allograft and media samples, taken at transplantation, were submitted for microbial culture
- At 0 and 3-month timepoints:
  - Functional assessments
  - Gait analysis (GaitRite®)
  - VAS pain and joint effusion scoring
  - Range of motion measurements
- Additional assessment 3-month timepoint:
  - Radiographic and gross assessments
  - Chondrocyte viability
  - Microbial culture of synovial fluid and transplanted tissues
- Statistical Analysis (Significance set at $p<0.05$):
  - Paired *t*-Test (normally distributed data)
  - Mann-Whitney rank sum test (non-normally distributed data)



Results and Discussion

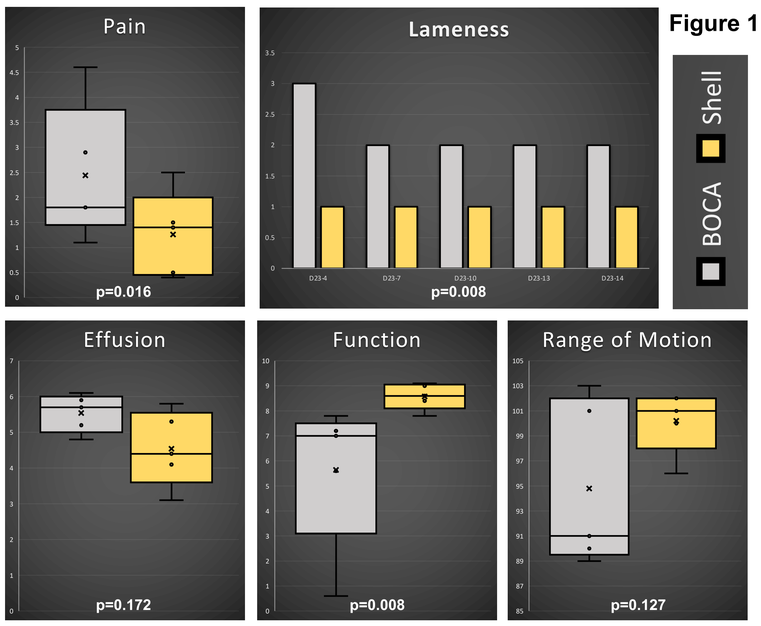


Figure 1

Figure 1; Pain and lameness were significantly more severe (p=0.016 and p=0.008 respectively) and function was significantly more compromised (p=0.008) for BOCA when compared to Shell. Effusion and range of motion were not significantly different between groups.

Figure 2

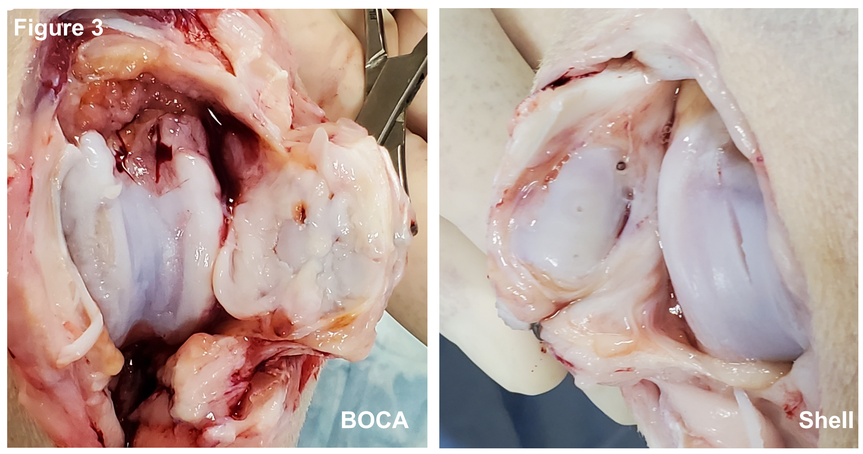
Microbial cultures of MOPS® media and remnant OCAs were negative at time of transplantation.

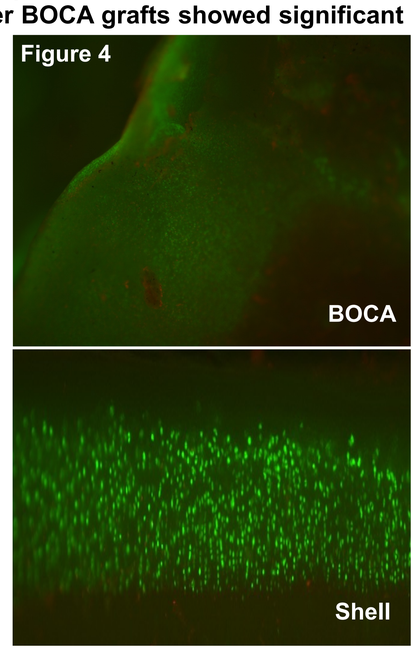
Figures 2 & 3: Radiographic and gross assessments of BOCA grafts revealed fissuring, fragmentation, and resorption with corresponding trochlear erosions, whereas Shell grafts showed maintenance of OCA articular cartilage integrity, tissue architecture with incorporation, and trochlear cartilage preservation.

Figure 4: Viable chondrocytes were noted in all BOCA and Shell OCAs, however BOCA grafts showed significant cell phenotype changes and tissue remodeling while Shell OCAs maintained hyaline cartilage morphology

At the 3-month endpoint there were no clinical signs of infection or rejection responses.

Endpoint microbial cultures are pending.





Conclusion

Patellar BOCAs can be recovered, machined, stored, shipped, and transplanted to maintain asepsis and chondrocyte viability, but require further optimization in order to result in effective integration and joint function.

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