BONE
Evaluation of bone regenerative capacity following distraction osteogenesis of goat mandibles using two different bone cutting techniques

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Fig. 3. Histological assessment of bone healing during splitting and DO. Representative H & E 100× micrographs of sections depicting the gap regions localized between the proximal and distal ends of the osteotomy are presented. Vertical osteotomies at the end of the distraction period (a) and 10 (c) and 35 (f) days later are represented by (a), (c) and (f); sagittal splitting at the end of the distraction period (b) and 10 (d) and 35 days (e). Fibrous tissue (FT), woven bone (WB), lamellar bone (LB), cartilaginous tissue (CT), periosteal bone (PB).
Fig. 2. MCT images reconstructed for distraction gaps of goat mandibles 35 days after the end of distraction, showing the amount of newly formed bone trabeculae (green) in the gap between the proximal and distal fractured ends. The old and remodelled bones are coloured yellow, while the medullary cavities and soft structures are coloured brown. The upper images represent vertical osteotomy while the lower images represent sagittal splitting. The views in (a) and (c) were reconstructed in sagittal plane while the views in (b) and (d) were reconstructed in the axial plane.
The effects of surgicel and bone wax hemostatic agents on bone healing: An experimental study

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ABSTRACT

Background: The biological effects of hemostatic agents on the physiological healing process need to be tested. The aim of this study was to assess the effects of oxidized cellulose (surgicel) and bone wax on bone healing in goats’ feet.

Materials and Methods: Three congruent circular bone defects were created on the lateral aspects of the right and left metacarpal bones of ten goats. One defect was left unfilled and acted as a control; the remaining two defects were filled with bone wax and surgicel respectively. The 10 animals were divided into two groups of 5 animals each, to be sacrificed at the 3rd and 5th week postoperatively. Histological analysis assessing quality of bone formed and micro-computed tomography (MCT) measuring the quantities of bone volume (BV) and bone density (BD) were performed. The results of MCT analysis pertaining to BV and BD were statistically analyzed using two-way analysis of variance (ANOVA) and posthoc least significant difference tests.

Results: Histological analysis at 3 weeks showed granulation tissue with new bone formation in the control defects, active bone formation only at the borders for surgicel filled defects and fibrous encapsulation with foreign body reaction in the bone wax filled defects. At 5 weeks, the control and surgicel filled defects showed greater bone formation; however the control defects had the greatest amount of new bone. Bone wax filled defects showed very little bone formation. The two-way ANOVA for MCT results showed significant differences for BV and BD between the different hemostatic agents during the two examination periods.

Conclusion: Surgicel has superiority over bone wax in terms of osseous healing. Bone wax significantly hinders osteogenesis and induces inflammation.
**Figure 1:** Histological images of control and test defects filled with surgicel and bone wax. (a) Longitudinal section of goat metacarpal bone at 3 weeks postoperatively (H and E, original magnification x100) (b) control defect at 3 weeks (c) surgicel filled defect at 3 weeks (d) bone wax filled defect at 3 weeks (H and E, original magnification x200)

**Figure 2:** Histological images of control and test defects filled with surgicel and bone wax. (a) Longitudinal section of goat metacarpal bone at 5 weeks postoperatively (H and E, original magnification x100) (b) control defect at 5 weeks (c) surgicel filled defect at 5 weeks (d) bone wax filled defect at 5 weeks (H and E, original magnification x200)
Figure 3: Micro-computed tomography sections of the goat metacarpal bones showing the control defects and the defects filled with surgicel and bone wax in order from left to right. (a) Axial reconstruction of the defects at 3 weeks (b) sagittal reconstruction of the defects at 3 weeks (c) axial reconstruction of the defects at 5 weeks (d) sagittal reconstruction of the defects at 5 weeks. The cortical bone is colored blue, the medullary bone and soft tissue are colored brown and the newly formed bone is colored yellow.
DEFINITION
STRUCTURAL CONSTITUENTS
Osteoprogenitor cells
Osteoblasts
Osteocytes
Osteoclasts
Osteoblast

Osteocyte

Osteoclast

Bone Cells
BONE RESORPTION
BONE MATRIX
Inorganic

Organic
Bone

- 67% Inorganic
  - Hydroxyapatite
    - 28% Collagen
- 33% Organic
  - Noncollagenous proteins

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TYPES OF BONE
LAMELLAR BONE
Compact
Spongy
COMPACT BONE (Long Bone, TS)
Periosteum

Outer fibrous layer

Inner osteogenic layer

Thin layer of compact bone

Irregular bone trabeculae

Bone marrow inside Marrow space

Osteocyte inside lacuna

CANCELLOUS BONE (Rib, T.S.)
Incremental lines of bone

- Resting lines
- Reversal lines
- Faint black line
- Periosteum
- Endosteum
NON LAMELLAR BONE
Coarse fibered woven bone
Bundle bone
ALVEOLAR PROCESS
DEFINITION
DEVELOPMENT
MANDIBLE
ENDO-CHONDRAIL BONE FORMATION
STRUCTURE OF THE ALVEOLAR PROCESS
Gingiva

Periodontal ligament

Cementum

Alveolar process
ALVEOLAR BONE PROPER
A, Enamel; B, Dentin; and C, Dentino-enamel junction
The pulp cavity
Teeth are composed of pulp (arrow on the second molar), enamel (arrow on the first molar), dentin (arrow on the second premolar), and cementum (usually not visible radiographically)
Lamina dura
Periodontal membrane space
Alveolar crest is pointed at the anterior teeth
Alveolar crest is flattened at the posterior teeth and parallel to the cemento-enamel junction of adjacent teeth.
Ladder-like arrangement of bony trabeculae (Mandible)
Numerous, delicate irregular bony trabeculae
SUPPORTING ALVEOLAR BONE
The cortical plate
The supporting bone
Clinical consideration
5- Malposition:

Tilting/Tipping

- tooth is tilted on its long axis
- axial inclination changed
Mesial drift
Bony alveolus