MANAGEMENT OF MAXILLARY ALVEOLAR PROCESS FRACTURES

Incidence of maxillofacial traumas is reported steadily increasing, maxillary fractures being extremely severe. Maxillary alveolar process (AP) and front teeth are traumatized more frequently than any other parts of the maxilla. Deprivation of teeth and AP post-traumatic flaw as well as loss of alveolar height not only create a cosmetic defect but also complicate subsequent prosthetics of the patients. The work was initiated to assess efficacy of “CollapAn L” in comparison with a combination of “Osteon”, osteoplastic material, and “Colla Guide” resorbable membrane in prevention of AP post-traumatic flaws and deformities. 60 patients aged from 16 to 47 with the comminuted fractures of maxillary AP emergently hospitalized were examined and treated. The findings showed that combination of “Osteon” and “Colla Guide” resorbable membrane is the one to increase efficacy of the treatment, facilitating preservation of and alveolar crest height and shape. In addition, preservation of bone tissue mineralization helps avoid risk of the bone wound inflammatory morbidity.

Keywords: Fracture, maxillary alveolar process, xenotransplant, resorbable membrane, osteoplastic material.

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Introduction

Today incidence of maxillofacial traumas is reported steadily increasing, maxillary fractures being extremely severe. Fractures of maxillary alveolar process (AP) and front teeth are common injuries (Shamsutdinov et al., 2002). Maxillary fractures account for 5-18% of all facial skeleton injuries (Adams et al., 2000). Generally, AP fractures are reported to take place in 9.7-76.9% of the injuries, frequently concomitant with other maxillofacial fractures (Carlin et al., 1998). In 35.3% of cases AP fracture is found with the loss of teeth and bone cortex, prevailing in the front maxilla (Ippolitov et al., 2003; Kogan and Bogatov, 2004). Performing primary debridement surgeons often have to remove small bone fragments.

Loss of teeth and bone tissue cortex usually result in AP post-traumatic defect, complicating subsequent prosthetics in the patients. Preservation of AP anatomical integrity aiming at prevention of post-traumatic alveolar crest deformity is an urgent problem in surgical dentistry. To restore bone defects various materials and methods can be used. The work was initiated to study efficacy of “CollapAn L” (Intermedapatit, Russian Federation) xenotransplant compared to using osteoplastic material “Osteon” (Genoss Co., Ltd, Korea) with “Colla Guide” resorbable membrane (Bioland, Korea).

Today various materials are used to help avoid risk of complications in management of AP fractures. “CollapAn L” is a xenotransplant consisting of a synthetic bone-salt (hydroxyapatite) and scleral collagen available in patches, granules and gels. Gradual early formation of cell reaction-free thin connective tissue capsule was observed upon “CollapAn L” intramuscular implantation to rats (Zherdeev, 2007).

Material and methods

We examined 60 patients (49 men and 11 women) aged from 16 to 47 with the comminuted fractures of maxillary AP. 30 people were traumatized at home, 22 patients underwent out-door traumas, 8 subjects got injuries during sporting events.

All patients received primary debridement at admission. Following antiseptic wound treatment, the small bone fragments and teeth under local anesthesia with 2% lidocaine were repositioned. Teeth were fixed by means of flat splint.

All patients were emergently hospitalized at the Maxillofacial Surgery Department, Tashkent Medical Academy 2nd Clinic (Uzbekistan). 31 of 60 patients had frontal teeth AP fracture, 29 subjects were traumatized in the area of premolars and molars. Loss of teeth was found to accompany AP fracture in 42 cases. Maxillary AP fracture was found combined with the mandibular fracture in 25 patients, concomitant brain concussion was registered in 32 patients.

The patients were divided into three groups: 1st group included 18 controls receiving conventional open wound management; 2nd group comprised 24 patients undergoing treatment with “CollapAn L”; and 3rd group (18 patients) undergoing treatment with combination of “Osteon” and “Colla Guide” resorbable membrane.

In the 2nd group patients “CollapAn L” was used considering the type of injury: “CollAn L” granules were used in comminuted fractures; “CollapenAn L” plates were applied on outer cortex to be covered with mucoperiosteal flap fixed by interrupted suture by means of vicril 3-0 (Ethicon, Jonhson & Johnson, USA)

In the 3rd group patients “Osteon” was applied on a bone wound, outer cortex was applied with “Colla Guide” resorbable membrane to be subsequently covered with mucoperiosteal flap fixed by vicril 3-0 interrupted suture (Ethicon, Jonhson & Johnson, USA). The sutures were removed 8-9 days after.

To assess efficacy of the treatment passing 6 months, the X-ray densitometry was used to measure bone density and mineralization degree. Densitometer (DENSITY, USA) was used to analyze and compare the findings with the standard reference. To compare the extent of bone demineralization in comparison with the normal one (2.79-3.57) the grading system including high (0.31-0.212), moderate (0.212-1.372) and mild (1.372-2.79) degrees was used.

Results

In all patients the first intention wound healing took place. Inflammatory complications were observed in three controls (1st group), no inflammatory complications were found in other groups. In assessment of these patients’ clinical condition the presence of AP defects and deformities and dental arch were taken into account. Wound suppuration was seen in 3 of 24 patients (12.5%). Post-operatively migration of “CollapAn L” with the sanious discharge was observed on 5th-7th day. Subsequent X-ray densitometry demonstrated moderate demineralization (2.65±0.05). A bone matrix, “CollapAn L” facilitates formation of callus stimulating osseous tissue restoration.

In 18 patients managed with the combination of “Osteon” and “Colla Guide” resorbable membrane the first intention wound healing was observed. AP deformation in a remote period was found in one patient (5.5%) only. Subsequent X-ray densitometry demonstrated demineralization degree closer to that of normal bone (2.88±0.05).

Discussion

Frontal maxillary AP fractures with the loss of teeth and bone tissue cortex are those frequently registered (Ippolitov et al., 2003; Kogan and Bogatov, 2004; Adams at al., 2000; Carlin et al., 1998). Deprivation of teeth and AP post-traumatic flaw as well as loss of
alveolar height not only create a cosmetic defect but also complicate subsequent prosthetics of the patients. Various materials and methods can be used to restore bone defects. “CollapAn L” is a xenotransplant consisting of a synthetic bone-salt (hydroxyapatite) and scelral collagen available in patches, granules and gels. Lincomycin, as its slow-releasing antibiotic component, serves to preserve antibacterial activity in the wound within 20 days after application. The material is widely used for restoration of bone defects of various etiologies.

Actually “Osteon” is a bone matrix, “Colla Guide” resorbable membrane facilitates bone wound healing. Combination of these materials helps to improve bone defects in AP fractures, restore AP height and shape.

In the control group three patients had inflammatory complications, in 5 patients AP deformity took place.

In our study incidence of complications following application of “CollapAn L” made 12.5%. A partial rejection of the material resulting in efficacy reduction could be seen when it was used without resorbable membrane. Six months later results of densitometry showed moderate demineralization.

As to combination of “Osteon” and “Colla Guide” resorbable membrane in treatment of AP fractures, AP deformity could be observed in one patient only (5.5%). Bone demineralization was mild.

The findings suggest that a combination of “Osteon” and “Colla Guide” resorbable membrane helps preserve alveolar crest height, uniformity of alveolar arch cortex and bone mineralization. Bone tissue restores, formation of secondary bone matrix took place that makes possible facilitating subsequent prosthetics of the patients.

**Conclusion**

When the osteoplastic materials are not used in the management of the patients following primary debridement the AP flaws and alveolar crest deformities can be seen in patients with maxillary AP fractures. In addition, bone tissue demineralization is found to persist 6 months later, complicating subsequent prosthetics.

Use of “CollapAn L” in the management of patients with AP fractures serves for restoration of AP form, preserves the bone mineralization.

Combination of “Osteon” and “Colla Guide” resorbable membrane facilitates increasing efficacy of the treatment, preserving alveolar crest height and shape. In addition, preservation of bone tissue mineralization helps avoiding risk of the bone wound inflammatory morbidity.

**References**


