



Endoscopic transnasal approach to repair the orbital floor fracture with preserving fractured bones

Kazuhiro Omura, Nobuyoshi Otori, Mamoru Yoshikawa, Yoshinori Matsuwaki, Daiya Asaka, Tetsushi Okushi, Takuto Yoshida, Tsuguhisa Nakayama, Hiroshi Moriyama
Department of Otorhinolaryngology, Jikei University School of Medicine

ABSTRACT

Background: Orbital floor fractures (OFF) are common injury secondary to blunt ocular trauma. They can lead to enophthalmos, diplopia, infra orbital nerve hypoesthesia and pain. The primary aim of orbital wall reconstruction is to prevent these late complications. Many OFF patients have been treated by transantral approach or subciliary approach. However, in these methods, gingivobuccal incision or percutaneous incision are made and insertion of autogenous or alloplastic materials is required. In recent years, we developed a more minimum invasive technique of endoscopic transnasal approach(ETA) to repair the OFF with preserving and repositioning the fractured bones. This study is to review our technique of ETA to the OFF patients.

Material & Methods: Nineteen OFF patients treated with ETA were reviewed in a retrospective fashion. Patient clinical data including type of fracture, points of muscle contact, and period from injury to surgery were collected from patient charts. Preoperative and postoperative (> 4 months) questionnaire, CT scans and Hess test were also collected. Surgical outcomes including patient's subjective symptom and objective examinations, and complications were evaluated. Post operative follow-up time was 4 months to 2years in all patients.

Results: The subjective symptoms were recovered in all patients. Postoperative Hess Ratio showed no limitation of eye movement after surgery. Postoperative CT scan also showed that the fractured bone of orbital floor was identified in the almost original anatomic location 6 month after surgery. No complications and bone absorption were found after surgery.

Conclusion: The novel technique of ETA to the OFF patients resulted in excellent outcomes. The indication of this technique was considered to be limited in the posterior part of orbital floor. But it allows more minimum invasive surgery for the patients without any incisions and graft placement. We still have to watch the late complications and the presence/absence of the fractured bone absorption.

CONTACT

Kazuhiro Omura
Department of otorhinolaryngology, Jikei University School of Medicine
Email: kazuhirono1@hotmail.com
Phone:+81-3-3433-1111

INTRODUCTION

Orbital floor fractures (OFF) are common injury secondary to blunt ocular trauma. They can lead to enophthalmos, diplopia from extraocular muscle dysfunction, infra orbital nerve hypoesthesia and pain followed by increased intraorbital pressure.

The primary aim of orbital wall reconstruction for the patients with OFF is to prevent these late complications. Many OFF patients have been treated by transantral approach or subciliary approach. However, in these methods, gingivobuccal incision or percutaneous incision are made and insertion of autogenous or alloplastic materials is required.

In recent years, we developed a more minimum invasive technique of endoscopic transnasal approach to repair the OFF with preserving and repositioning the fractured bones. This study is to review our technique of endoscopic transnasal approach to the OFF patients.

METHODS AND MATERIALS

Nineteen OFF patients treated with endoscopic transnasal approach were reviewed in a retrospective fashion.

All surgeries were performed under general anesthesia. Since the ostium of the maxillary sinus was widely opened cautiously (Fig.1B), 70-degree endoscope was used to view the fracture area in the roof of the maxillary sinus (Fig.1C). After the edges of the fracture bones were exposed (Fig.1D), the mucoperiosteal flap including the fractured bones was elevated endoscopically from the intraorbital periosteum using our original curved elevator(Fig.1E). The herniated orbital contents were made free from the adhesions, and also repositioned into orbital cavity (Fig.1F). The mucoperiosteal flap was reconstructed in an original anatomic location with fully preserving the fractured bones. A urethral balloon catheter was inserted in maxillary sinus endoscopically to fix the location of the fractured bones(Fig.1G). The balloon catheter was removed 7 days after operation.

Patient clinical data including type of fracture, point of muscle contact, period from injury to surgery were collected from patient charts. Preoperative and postoperative (> 4months) questionnaires, computed tomography(CT) scans and Hess test were also collected. Distance between fractured bone and orbital floor (DBFO) from CT scans (Fig.2) and Hess Area Ratio(HAR)(%) were measured(Fig.3). Surgical outcomes including patient's subjective symptom and objective examinations, and complications were evaluated. Post operative follow-up time was 4 months to 2years in all patients.

Figure 1 A-G: ETA to the OFF patients with preserving the fractured bones

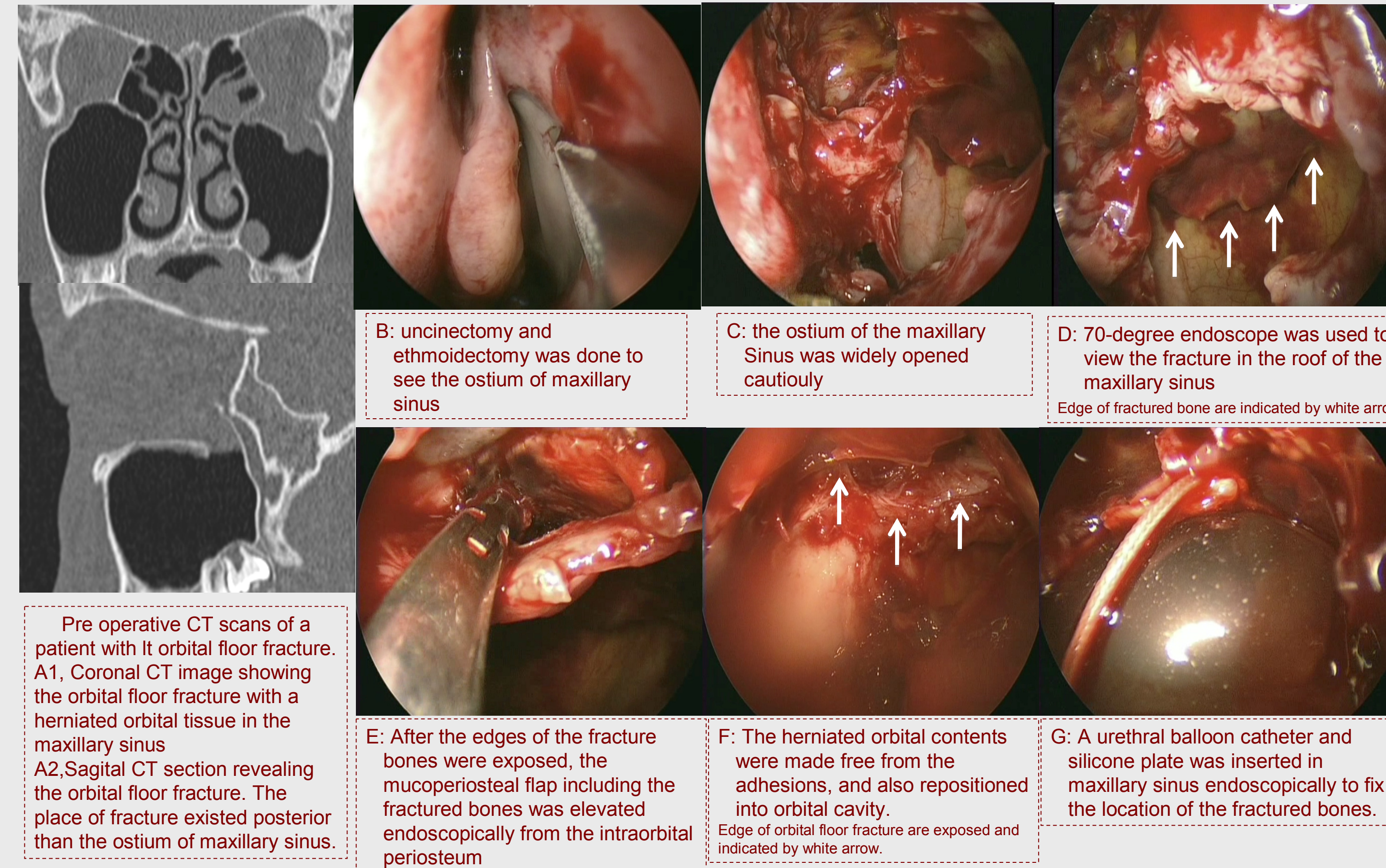


Figure 4: Surgical outcome of subjective symptom and objective examinations

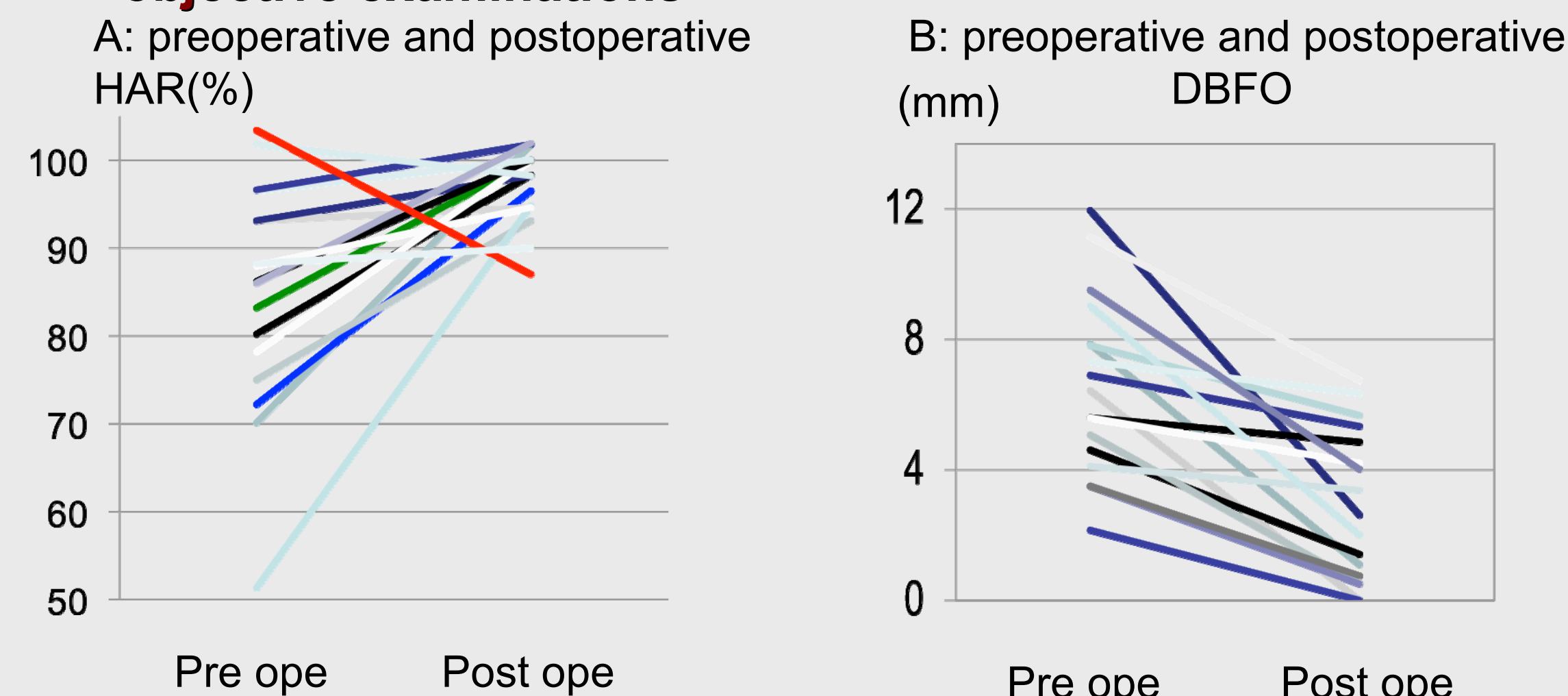
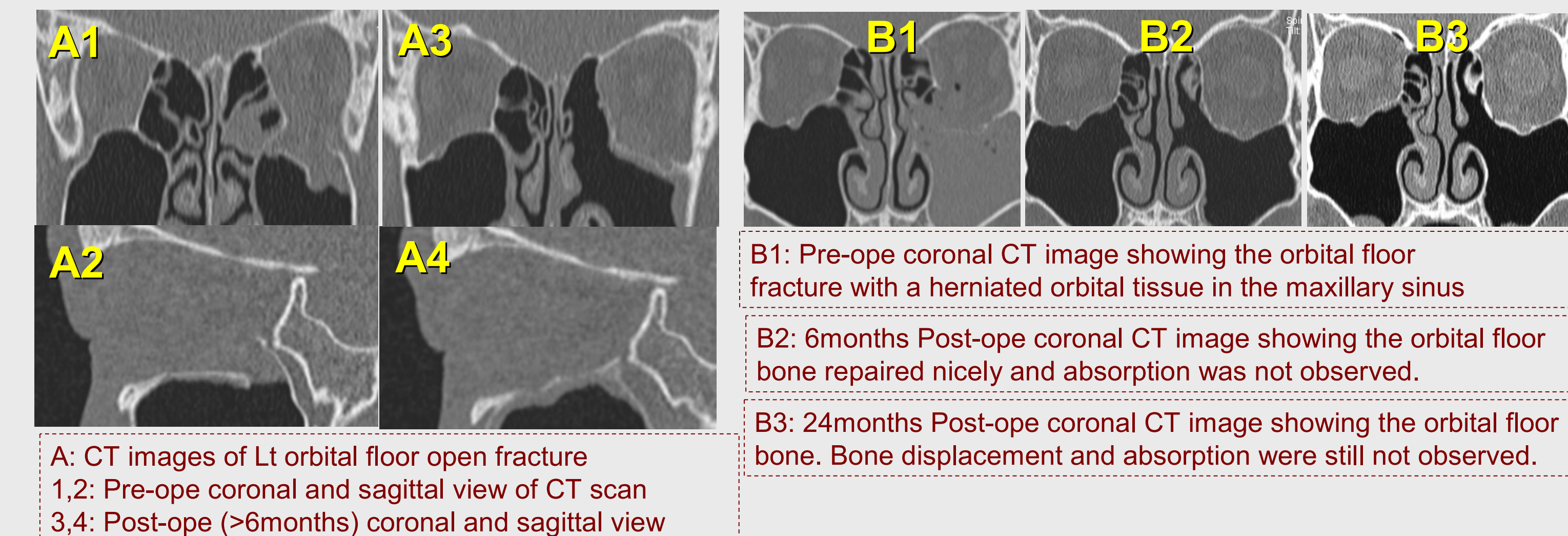


Figure 5 A-B: Preoperative and postoperative(6mo.2yrs) CT images of OFF patients



DISCUSSION

The subjective symptoms were almost recovered in all patients. All of the HAR(%) were become above 85% postoperatively, from 51.3-100 to 87-100,(Ave.85.7-97.5) (Fig.2B). 18 out of 19 of the DBFO(mm) improved to approximately half of them from 2.2-12 to 0-11.9, (Ave.6.5 to 3.1). (Fig.4C) But 3 patients complaint slight diplopia when they move full range of eye motion. 1 out of 3 patients with slight diplopia are caused by insufficient repairment of surgical procedure. 2 out of 3 patients with slight diplopia are caused by mis-indication of the ETA method. ETA method has the limitation of the patient indication because operation is done through the ostium of maxillary sinus. If the fractured area can be fully exposed through the ostium, We can do surgical repairment nicely. But in case of the fractured area existing more anterior side of the roof of the maxillary sinus, we can not fully repair the fractured bones and remove adhesions of anterior side through ETA. Postoperative CT scan also showed that the fractured bone of orbital floor was identified in the almost original anatomic location 6 month and 24 months after surgery. (Fig.5) he complications and bone absorption were not found after surgery.

CONCLUSIONS

The novel technique of ETA to the OFF patients resulted in excellent outcomes. The indication of this technique was considered to be limited in the posterior part of orbital floor. But it allows more minimum invasive surgery for the patients without any incisions and graft placement. We still have to watch the late complications and the presence/absence of the fractured bone absorption.

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