3D Orbital Anatomy as Seen in a Fronto-Orbito Zygomatic Approach

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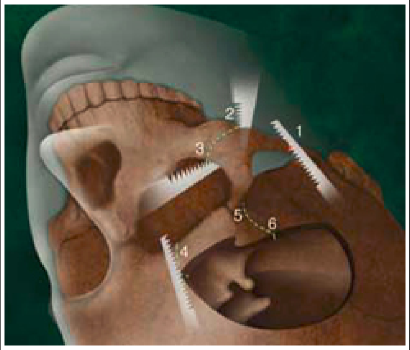
Introduction

A thorough understanding of the orbit, its enclosed structures, and their complex spatial relationships bears relevance in a variety of surgical and anatomical disciplines. The anatomy beneath the periorbita is a fragile and complex network of neurovascular architectures flanked by a series of muscular and glandular structures. As a result, surgical interventions in the orbit are among the more challenging encountered by neurosurgeons. The purpose of this study is to evaluate the operative exposure of the orbital contents obtained with an extended fronto-orbito-zygomatic (FOZ) approach and to describe the spatial relationships (microsurgical anatomy) of the various constituents of the orbit as seen through this approach. Stereoscopic photography provides a novel method for accurately representing the spatial properties of the orbit and its contents.

Methods

8 preserved cadaveric heads (16 sides), underwent a standard FOZ approach (Figures 1-3, 6) to expose the contents of the orbit. The osteotomy was completed with removal of the anterior clinoid process and with removal of the greater and lesser sphenoidal wings. The FOZ window and its contents were photographed at multiple angles with a stereoscopic camera system.

Figure 1. Fronto-Orbito Zygomatic Approach.

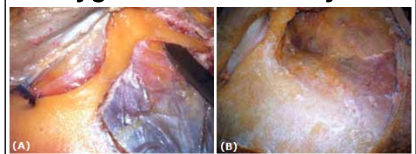


After a standard pterional osteotomy, the orbital and zygomatic osteotomies are completed with a reciprocating saw.

Results

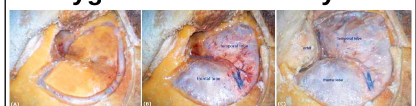
Our study identified sequential surgical steps in approaching and dissecting the intraorbital contents. We present detailed stereoscopic photographs of the orbit (Figures 4, 5), revealing the complex neurovascular relationships of the intraorbital structures as seen through an FOZ approach.

Figures 2. Fronto-Orbito Zygomatic Osteotomy I.



(A) the pericranial flap was elevated to expose the supraorbital rim, the zygoma and the lateral orbital rim are visible; (B) the temporalis muscle was elevated and reflected inferiorly.

Figures 3. Fronto-Orbito Zygomatic Osteotomy II.



(A,B) the standard pterional bone flap was elevated, (C) removal of additional bone along the cranial base decreased the need for retraction and increased the angle over which structures at the depth of the surgical corridor could be viewed.

Figure 4. Relationship Between the Lateral Skull and the Orbital Contents.

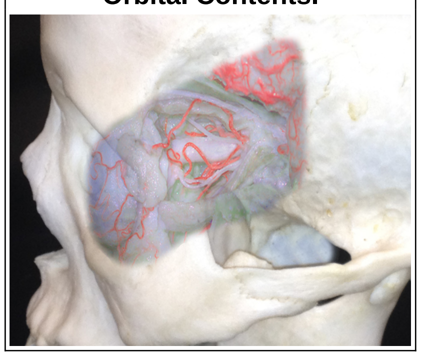
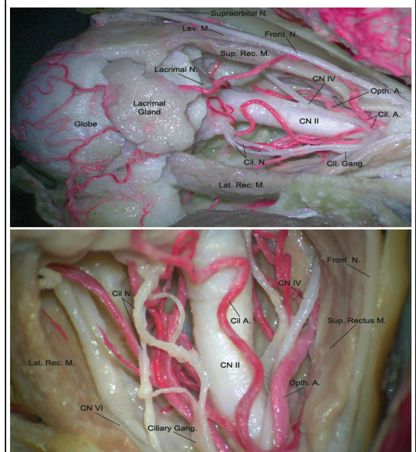


Figure 5. Microanatomy of the Left Orbit.

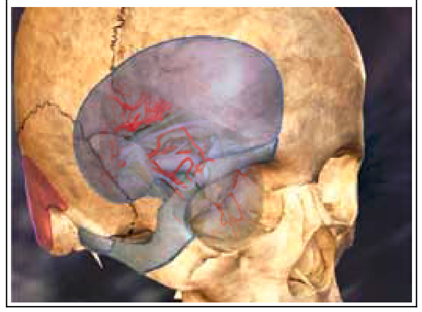


Lateral (above) and superior (below) views of the orbital contents.

Conclusions

Our anatomical evaluation confirmed that an FOZ craniotomy completed with extensive removal of the greater and lesser sphenoidal wings and removal of the anterior clinoid process, provides excellent exposure of the intraorbital contents. A thorough knowledge of the microsurgical anatomy as seen through this surgical perspective allows for a safer dissection of the intraorbital structures. Stereoscopic photography provides a novel method for accurately representing surgical anatomy and the depth of the surgical field.

Figure 6. FOZ Surgical Window and View of the Orbital Contents.



Learning Objectives

By the conclusion of this session, participants should be able to (1) describe the microsurgical anatomy of the orbit and (2) the fronto-orbito zygomatic approach.

References

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