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Recovery of optic nerve function following unilateral posttraumatic blindness

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Introduction

In craniomaxillofacial traumatology, surgical oncology and craniomaxillofacial reconstruction, the procedure may interfere with the prechiasmatic visual pathway. Precise concepts and therapeutic strategies are mandatory to detect and deal with anterior visual pathway disorders. In order to find these strategies, knowledge on pathomecha-nisms of potential optic nerve trauma and on primary radiological investigations and on further diagnostic measures are important.
As displayed in figure 1 four different anatomical segments of the optic nerve are differentiated. Either of them may be damaged with subsequent impairment of optic nerve function.

Due to difficult neuroophthalmological testing on visual pathway functioning in severely injured patients or even during craniomaxillofacial reconstruction, we established flash-evoked visual potentials (VEP) and electroretinogram (ERG) as reliable electrophysiological methods to collect distinct information whether the visual pathway func-tion is intact, pathological but still present or absent. Case reports show that subjectively or objectively approved unilateral amaurosis does not necessarily mean irreversible visual loss. The electrophysiological evaluation together with multiplanar CT are important for the immediate identification of optic nerve trauma. The results of this evaluation will provide diagnostic information on whether surgical intervention and/or conservative therapy is required to prevent secondary optic nerve damage.

The following case report demonstrates the importance of both early clinical and electrophysiological testing for the successful therapy of a compressive traumatic optic nerve lesion via a severely impacted lateroorbital bone fragment.

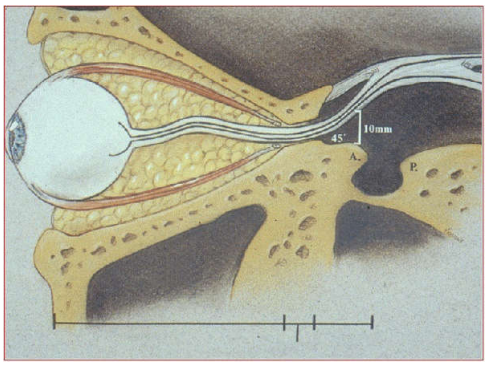


Fig. 1:
Segments of the optic nerve which may be damaged by trauma (length in mm):
1 intraocular (1)
2 intraorbital (25-30)
3 intracanalicular (8)
4 intracranial (15)

Case Report

An 18 years old boy was admitted with a severely dislocated fracture of the poste-riolateral aspect of the right orbital wall (Fig. 2a - b). At admission ophthalmologic examination of the conscious and cooperative patient revealed no light reception. Neurophysiological testing showed a pathological but still reproducible flash-VEP and a normal ERG (Fig. 3a - d). Immediate surgical intervention and mega dose corticoid therapy (methylprednisolon - Urbason®: bolus injection: 30 mg/kg body weight and subsequent 5.4 mg/kg body weight for the following 47 hours) was performed and full clinical and neurophysiological recovery of the optic nerve function after initial unilateral blindness within the following 24 hours was achieved (Fig. 3a -d). The clinical follow up was without any complications (Fig. 4 a - b).

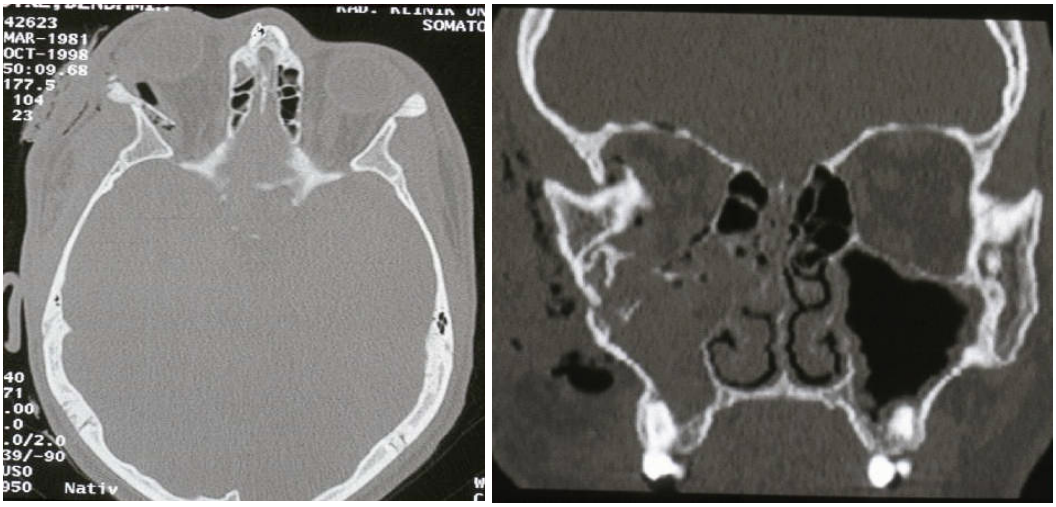


Fig. 2a and 2b:
Axial and coronal CT-scans of a severely dislocated fracture of the posteriolateral aspect of the orbital

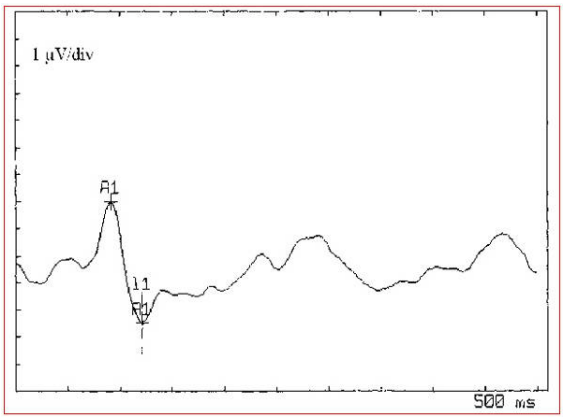


Fig. 3a

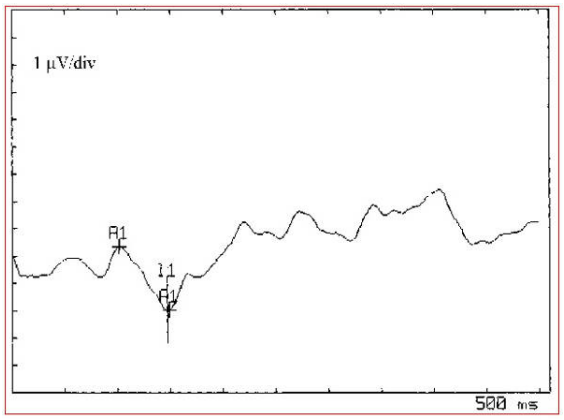


Fig. 3b

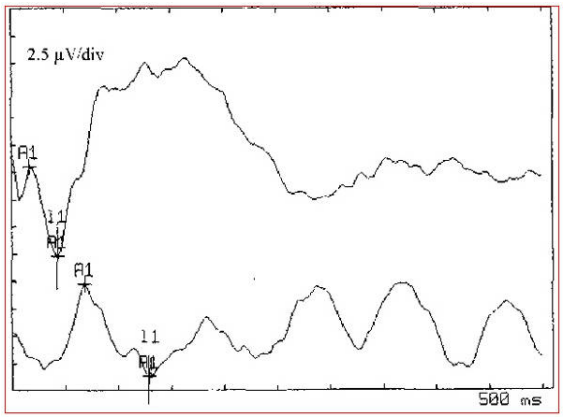


Fig. 3c

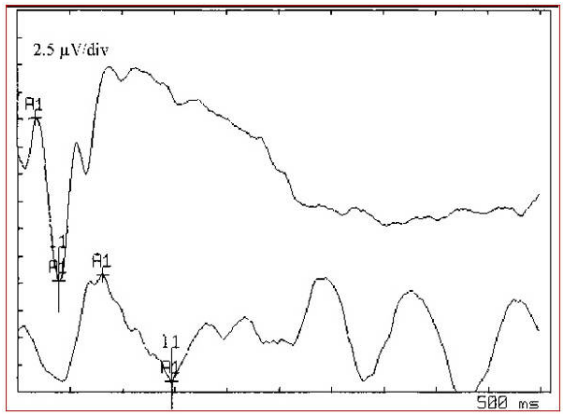
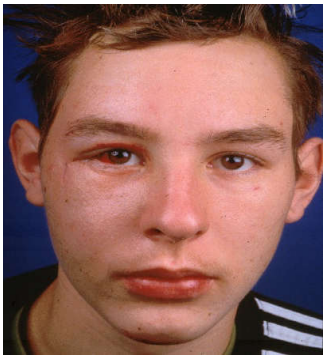


Fig. 3d

Fig. 3a - d:
y-axis: average potential calculated from 100 single potentials
x-axis: registration time 500ms (50 ms steps)

Preoperative situation: In comparison to the healthy left eye (Fig. 3a) the amaurotic right eye (Fig. 3b) shows a pathological but still reproducible flash-VEP with a longer latency stage [(I) - 26 ms] and a amplitude reduction (A) of 50%. Fig. 3c and d display the postoperative situation. The amplification is 2.5 times higher than in fig. 3a and b. In comparison to the non-affected left side (Fig. 3c) the flash-VEP (lower curve) for the right eye (Fig. 3d) shows a longer latency stage (20 ms) and a identical amplitude. The ERG (upper curve) is well recordable for both eyes.



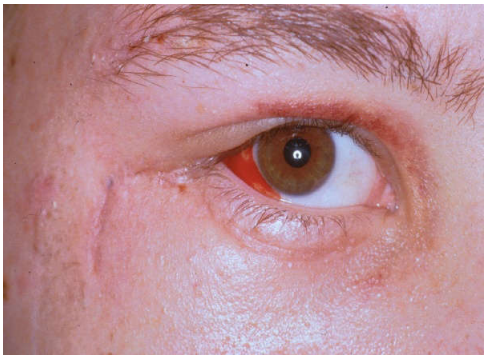


Fig. 4a Fig. 4b

Fig. 4a - b:
Clinical situation 10 days postoperative with full clinical and neurophysiological recovery. A cicatrico-tomy is planned similar with the removal of the inserted osteosynthesis material.

Conclusion

In addition to clinical examination and radiological diagnosis initial neurophysiological testing (ERG, flash-VEP) of the retina and optic nerve function are essential in order to obtain adequate information for the necessary therapeutic procedure in case of severe trauma of the orbit. Neurophysiological testing is especially a suitable diagnostic method for unconscious patients where clinical examination can not provide all essential information.

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Poster Faksimile:

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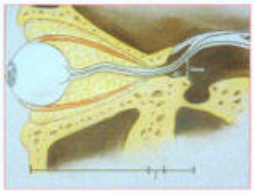

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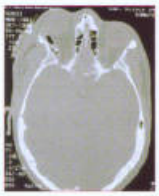

Left side: Fig. 2a and 2b

Axial and coronal CT-scans of a severely dislocated fracture of the posteriolateral aspect of the orbital wall.

Below: Fig. 3a – d (from left to right): y-axis: average potential calculated from 100 single potentials
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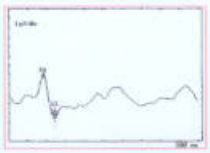

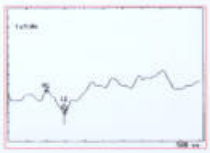

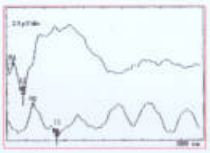

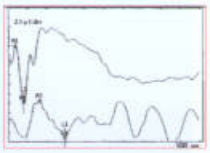

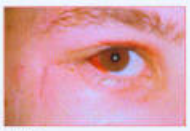

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