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# Medial and mediolateral orbital decompression in intractable Graves' Orbitopathy

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ABSTRACT

*Objective:* Graves' Orbitopathy (GO) has well established treatment guidelines; however, its management is still controversial. The aim was to evaluate the results of medial and mediolateral orbital decompression (OD) in intractable GO.
*Methods:* Retrospective chart review of all patients with advanced stages of GO, who underwent medial (1-wall) or mediolateral (2-wall) OD between May 2012 and November 2014 in our institution. Ophthalmologic examinations included visual acuity, Hertel exophthalmometry (proptosis), intraocular pressure (IOP), visual field (30:2) and diplopia. Follow-up was performed 1 week, 3 months and 1 year postoperatively. Additionally, a questionnaire was used to investigate subjective benefits.
*Results:* The study included 34 eyes of 20 patients. In our study, GO patients who underwent mediolateral OD had significantly higher IOP preoperatively ($p < 0.05$) and lower visual acuity, proptosis and visual field compared with patients who underwent medial OD. After 1- and 2-wall OD, visual acuity, proptosis, visual field and IOP in upgaze improved significantly. Using a questionnaire, the patients reported significant improvements in impaired vision, eye pain and pressure, vitality and social life. 94% of all patients reported they would repeat the operation. After 2-wall OD, the surgical scar had little effect.
*Conclusion:* With GO patients in advanced stages, both medial (1-wall) and mediolateral (2-wall) OD procedures are convincing therapeutic options. In more advanced GO stages with high IOP, 2-wall OD should be prioritized, as mediolateral OD had superior long-term functional outcomes.


## 1. Introduction

Graves' Orbitopathy (GO) is a rare ocular manifestation of autoimmune origin. It occurs in patients with thyroidal dysfunction and leads to deposition of hydrophilic glycosaminoglycans, proliferation of orbital adipose tissue and fibrosis of the extraocular muscles. Clinical symptoms include upper lid retraction causing wetting defects of the cornea, lateral flare, proptosis, periorbital edema, conjunctival injection, problems with color vision, diplopia and strabismus. In severe GO, muscle swelling can cause apical crowding and compressive dysthyroid optic neuropathy, thereby causing loss of vision and

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cosmetic disfigurement [1–3]. Although GO has well established treatment guidelines, its management is still controversial. Randomized controlled trials are rarely available within heterogeneous populations and differ in treatment outcome measures. Certain aspects are therefore guided by clinical experience and expert opinion [4,5].

The ultima ratio for GO patients is surgery, such as orbital decompression (OD). This occurs in cases where there has been no symptom improvement from immunosuppressive therapy and radiotherapy, and where patients have increased risk of dysthyroid optic neuropathy [6,7]. The removal of bony orbital walls increases the orbital cavity and volume for orbital tissue (increased orbital fat and muscle thickening). This increased cavity reduces symptoms like proptosis and compression of orbital structures, including the optic nerve. The surgical procedure includes the 1-wall, 2-wall and 3-wall OD [8]. Balancing mediolateral wall OD without intervening in the floor is described as a method that produces little shifting of the orbital content [9]. However, there is no consensus on the choice of surgical procedure, and therefore it remains an individual decision.

Our study was aimed at GO patients who underwent OD. We wanted to compare the outcomes and side effects of the medial or mediolateral OD technique.

## 2. Methods

This retrospective clinical study included all patients with GO who underwent medial (1-wall) or mediolateral (2-wall) OD at the Department of Otorhinolaryngology, Head and Neck Surgery, Charité Berlin, Campus Benjamin Franklin, between May 2012 and November 2014. The study was performed according to the Helsinki declaration guidelines and the ethics committee of the institution.

The diagnosis of GO was based on the Bartley and Gorman criteria and consisted of the following signs: eyelid retraction in association with laboratory evidence for thyroid dysfunction, exophthalmos, optic nerve dysfunction or extraocular muscle involvement [10]. The indication for surgical OD was performed by the Department of Ophthalmology of the Charité. The patients' condition did not ameliorate sustaining all available conservative treatment options, including high-dose steroids, and had progressively growing visual loss with increased risk of consecutive blindness due to optic neuropathy, increasing scotoma within the visual field and new-onset afferent pupillary deficit. The decision to operate and the choice of 1-wall or 2-wall OD was an individual decision made by the ophthalmologists based on ophthalmological examinations. The preoperative palpatoric examination of the orbital volume was performed to measure the orbital resistance and risk of optical nerve compression by pressing the globe back in the orbit. In severe cases, 2-wall OD was prioritized. At the informed consent discussion, both surgical techniques were explained; however, in all cases, either 1-wall or 2-wall OD was performed according to the recommendation of the ophthalmologist.

Demographics, predisposing factors, clinical characteristics, treatment methods and surgical indications were retrospectively reviewed from medical records.

Postoperative examinations were conducted at 1 week, 3 months and 1 year postoperatively. Preoperative and postoperative examinations included intraocular pressure (IOP), visual acuity, visual field (30:2), proptosis determined by Hertel exophthalmometry, and diplopia. IOP was measured in the primary gaze and in upgaze. Visual activity was determined using logMAR and represented in the European norm (EN ISO 8596, previously DIN 58220) [11]. Due to the lack of lateral bony margin after mediolateral OD, the same basic position was used postoperatively to determine the Hertel Index as preoperatively.

Subjective satisfaction was evaluated prior to and 1 year post surgery using a 13-point questionnaire that gauged satisfaction in terms of recovery of facial appearance, subjective ocular function, impairment in social life and vitality (see Supplementary Fig. 1). Impaired vision, eye pain/pressure, vitality and changes in social life were evaluated using a visual analogue scale from 1 to 10 (1 = not affected; 10 = very affected). The nominal items 'yes' and 'no' were used to evaluate if people were repeating this surgery.

Supplementary Fig. 1 related to this article can be found, in the online version, at http://dx.doi.org/10.1016/j.anl.2016.08.007.

### *Surgical technique*

All surgeries were performed under general anesthesia. The medial and mediolateral OD were performed by ENT surgeons (Fig. 1).

Medial wall OD was performed using an endoscopic approach. After nasal decongestion, the uncinate process was removed and a total ethmoidectomy was performed. The skull base, the lamina orbitalis, nasolacrimal duct and basal lamelle of the middle turbinate were exposed. The middle turbinate was retained. The ostium of the maxillary sinus was expanded and the maxillary sinus roof and the orbital floor were exposed. The sphenoid sinus was entered and the sphenoid sinus front wall removed. The bony optic canal of the lateral sphenoid sinus wall was exposed. The lamina orbitalis was removed back to the anterior sphenoid wall and then progressively until the nasolacrimal duct. The periorbita was incised from the sphenoid anteriorly, starting superiorly close to the ethmoid roof. The orbital fat prolapsed medially during constant pressure on the eye ball within the area of the former ethmoid cells. No fat was removed. Finally, we excluded any bleeding, evidence of cerebrospinal fluid leak or orbital hematoma. Pupils were equal, round and react to light bilaterally. No postoperative package was used.

For lateral OD, local anesthetic including epinephrine (1:200,000) was infiltrated at the lateral orbita. Incision was performed at the lateral canthus in the periorbital skin crease line. The lateral orbital wall was exposed, the periost was pushed forward and the lateral part of the orbita exposed including the frontozygomatic suture, the zygomatic arch and the orbital floor (foramen N. infraorbitale). The periorbita was separated from the medial part of the orbita. A wedge-shaped segment of the lateral orbital wall was removed with a drill extending the three landmarks. The periorbita was incised and

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