

## ORIGINAL STUDY

# Endonasal endoscopic orbital decompression - introducing the five steps technique

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## ABSTRACT

**OBJECTIVE.** To describe and evaluate the five-step approach for endonasal endoscopic orbital decompression.

**STUDY DESIGN.** A retrospective noncomparative case series.

**METHODS.** The distinctive five-steps technique for endonasal endoscopic orbital decompression was performed on 97 patients suffering from dysthyroid orbitopathy over the period of eleven years (2000-2010).

**RESULTS.** The method resulted in significant benefit for patient's visual acuity, proptosis, intraocular pressure, retraction of the eyelids and exposure keratitis. New-onset diplopia developed in 23 patients (23.7%). It persisted in 94.6% of patients with preoperative diplopia while 22.6% of patients experienced postoperative relief of diplopia.

**CONCLUSIONS.** Endonasal endoscopic orbital decompression is effective and safe procedure that improves vision, decreases proptosis and intraocular pressure with favorable cosmetic results in most patients. Post-decompression strabismus and diplopia are successfully managed by either eye muscle surgery or application of prisms.

**KEYWORDS:** orbital decompression, endoscopic, endonasal, dysthyroid orbitopathy

## INTRODUCTION

Dysthyroid orbitopathy or Graves ophthalmopathy is an autoimmune disorder that causes inflammation of the extraocular muscles, orbital fat and lacrimal glands, the final result being the increase in intraorbital pressure. These changes lead to characteristic clinical features such as proptosis, eyelid retraction, and restrictive myopathy while exposure keratitis and compressive optic neuropathy present the most serious signs of disease<sup>1,2</sup>.

Majority of patients presents with mild ophthalmopathy requiring only local supportive measures. Nevertheless, 3-5% of patients with severe disease need more aggressive and usually multidisciplinary approach<sup>3,4</sup>. The three main forms of treatment are corticosteroids, retrobulbar radiotherapy and orbital decompression. Orbital decompression is indicated for patients with exposure keratitis, compressive optic neuropathy and/or severe orbital inflammation with pain. Increasing number of patients are being surgically treated for aesthetic reasons<sup>5</sup>. A number of techniques and approaches have been described<sup>6-11</sup>.

The aim of our study was to review the results of endonasal endoscopic orbital decompression done in five well

defined consecutive steps in patients suffering from dysthyroid orbitopathy at ENT Department, Clinical Hospital Center Zagreb, Croatia over an 11 years period (2000-2010).

## PATIENTS AND METHODS

Endonasal endoscopic orbital decompression was performed on 97 patients with dysthyroid orbitopathy at the ENT Department of the Zagreb Hospital Center between January 2000 and December 2010. All patients had been previously examined at the Department of Ophthalmology and had received conservative treatment with corticosteroids, botulinum toxin injection, radiotherapy or a combination of these treatments. In 69 patients endonasal endoscopic orbital decompression was indicated because of active ophthalmopathy with compressive optic neuropathy and/or exposure keratitis, and 28 patients were operated on for aesthetic reasons. Compressive optic neuropathy was diagnosed according to decrease in visual acuity, defective visual fields or presence of optic disc congestion. Anterior segment signs included super-

ficial punctate keratitis, superior limbic keratoconjunctivitis, conjunctival injection and/or conjunctival chemosis. In patients with severe proptosis and eyelid retraction, corneal infiltration and ulceration were also found.

**Surgical Technique:** Five-steps endonasal endoscopic orbital decompression consists of: 1. identification of the sphenoid sinus, 2. identification of the maxillary sinus ostium and formation of the middle anastomy, 3. anterior and posterior ethmoidectomy, 4. removal of the medial orbital wall (lamina papiracea) and 5. performance of several horizontal, longitudinal incisions of the periorbital allowing the orbital contents to prolapse into the ex sinus cavities. Operation is performed under general hypotensive anesthesia, followed by infiltration of the operating field with the 1% xylocaine solution containing epinephrine (1:200,000). In most of the cases we performed a large middle anastomy avoiding the thick maxillary bone between the medial orbital wall and the orbital floor since this could result in **globe drop down phenomenon** due to lack of the bonny support and late vertical diplopia. The removal of the lamina papiracea begins from its middle part, proceeding backwards to the tendinous ring (orbital apex), upwards to the anterior skull base and downwards to the thick longitudinal bone and finishing around the insertion of the uncinat process. Once the periorbital area is widely exposed, a series of horizontal incisions are performed. While making incisions, the globe must be gently pressed from outside. After finishing all planned incisions, the globe must be pressed more radically to enable the movement of retrobulbar contents to the newly created space in the nasal cavity.

Preoperative and postoperative examinations which included best-corrected Snellen visual acuity, examination of the eyelids and cornea, ocular motility, cover testing, Hertel exophthalmometry and applanation tonometry were performed at the Department of Oph-

thalmology. Eyelid retraction was measured in millimeters (mm), in the primary eye position and without accommodation. Diplopia was not recorded in serious orbitopathies because the patients were not aware of the disturbance of the eye muscles. Development of diplopia after orbital decompression in such cases (new-onset diplopia) was thus a sign of improvement.

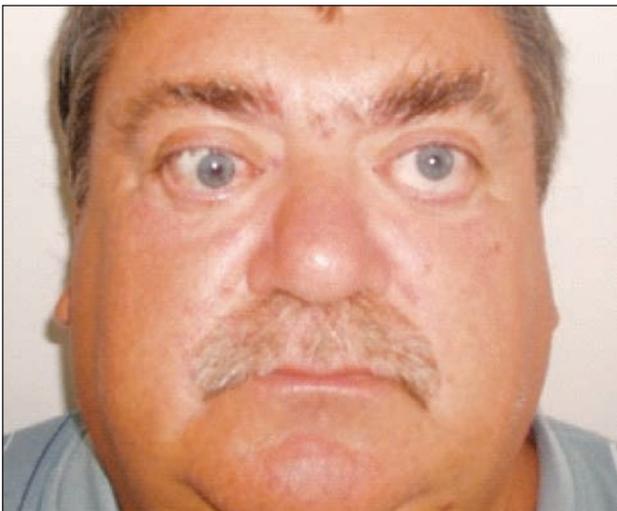
## RESULTS

The median duration of follow-up in our study was 12.5 months. Best-corrected Snellen visual acuity improved from preoperative  $0.81 \pm 0.28$  to  $0.92 \pm 0.21$  postoperatively in all patients. Proptosis decreased in all orbits after the decompression, ranging from 2 up to 8 mm (Figure 1). The preoperative mean Hertel exophthalmometry value was  $23.7 \pm 2.4$  mm and the mean postoperative value was  $19.0 \pm 2.6$  mm. Intraocular pressure decreased from preoperative  $19.4 \pm 3.4$  to postoperative  $16.2 \pm 3.0$  mmHg.

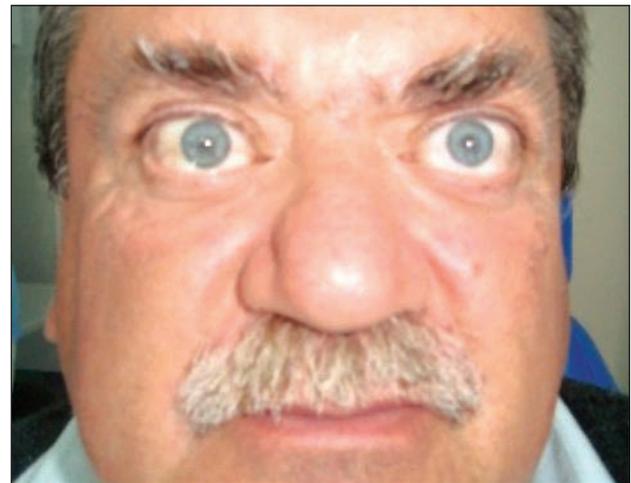
Retraction of the upper and lower eyelids and exposure keratitis were reduced postoperatively (Figure 2).

**Complications and Side Effects:** Diplopia persisted in 49 out of 53 patients who had preoperative diplopia (94.6%). Twenty two patients experienced postoperative relief of diplopia (22.6%). Ocular motility was subsequently corrected by eye muscle surgery in 43 eyes (31.3%) whereas prisms were used in other 45 manifestly strabismic eyes (32.8%).

Three patients had slight intraoperative bleeding, which was successfully controlled by gauze-flakes immersed in a decongestive solution. The bleeding did not require additional nasal packing. Two patients have developed orbital haemathoma (Figure 3), which resolved spontaneously within the next 48 hours requiring no additional treatment.



**Figure 1** Marked proptosis in Graves ophthalmopathy



**Figure 2** Postoperative result - eyelid retraction with exposure keratitis postoperatively



**Figure 3** Orbital haemathoma with normal ocular motility, isocoria and no proptosis. Haemathoma in both of the cases resolved spontaneously within the next 48 hours requiring no additional treatment

## DISCUSSIONS

Our study showed that surgical decompression of the orbit can resolve some of the symptoms of Graves' ophthalmopathy. Many different techniques and approaches have been reported<sup>6-12</sup>. In 1957, Walsh and Ogura described the transantral decompression, which has been the most favored technique until today, both the medial and inferior orbital walls are removed through a translid or transconjunctival approach. In 1990, Kennedy described the first endoscopically assisted orbital decompression in patients with Graves' ophthalmopathy, which later became favored over the classical external<sup>10-12</sup>. The advantages of this procedure are numerous: decreased morbidity, less common dysesthesia of the infraorbital nerve and no cosmetic disfiguring<sup>12</sup>. However, diplopia often develops or worsens postoperatively as a side effect of this technique.

In our study, visual acuity improved after surgery and intraocular pressure as well as proptosis were reduced. Similar findings were reported in other studies<sup>13-14</sup>.

Diplopia persisted in 49 out of 53 patients who had preoperative diplopia (94.6%). Twenty two patients experienced postoperative relief of diplopia (22.6%). Ocular motility was subsequently corrected by eye muscle surgery in 43 eyes (31.3%), whereas prisms were used in other 45 manifestly strabismic eyes (32.8%).

Modifications of the technique have been described in order to reduce the incidence of postoperative diplopia<sup>15-18</sup>. The three-wall approach does not change the balance in the orbit as much as the two-wall technique, which explains the reduced rates of postoperative diplopia with this technique.

Also, the severity of preoperative myopathy must not be overlooked because it represents an important factor as the amount of the removed bone.

## CONCLUSIONS

Based on our experience, we believe that orbital decompression should be performed in patients with active

Graves' ophthalmopathy and severe compressive optic neuropathy not responding to conservative treatment but also in patients with prominent exophthalmos for aesthetic reasons. Endonasal endoscopic technique done in five described steps is a safe procedure with beneficial effect on proptosis and intraocular pressure reduction as well as on improvement of visual acuity. Post-decompression strabismus and diplopia are successfully managed by either eye muscle surgery or application of prisms.

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