Abstract

Objective
To review the indications and outcomes for revision orbital decompression surgery for thyroid eye disease.

Methods
A retrospective case series of all revision orbital decompression procedures for thyroid eye disease, over the ten year period 01/01/2004-01/01/2014 was reviewed. Cases were examined for outcome measures previously described, including changes in proptosis, intraocular pressure, visual acuity and diplopia.

Introduction

Graves’ Disease is a multi-system autoimmune process affecting the thyroid gland, skin and orbit with an annual incidence of approximately 30/100 000. The well-described ocular manifestations (Thyroid Eye Disease, TED) represent the most common extra thyroidal manifestation of Graves’ Disease, affecting 55-85% of patients. The nature of TED remains somewhat controversial, with incomplete understanding of the underlying pathogenesis. Expansion of the extraocular muscles and orbital fat occurs in the active phase, with progressive inflammation for 6-24 months. TED is a sight-threatening disorder in up to 5% of patients with Grave’s Disease, usually resulting from compressive optic neuropathy due to crowding of the optic nerve at the bial sphenoidal apices.

Thyroid eye disease is a complex condition requiring multidisciplinary management. Treatment options include aggressive lubrication coupled with smoking cessation and maintenance of euthyroidism in mild disease; with medical therapy, immunotherapy or possibly radiotherapy considered for more severe forms. Surgical intervention, including orbital decompression, is usually reserved for the most severe cases. Surgery of some form is ultimately required in up to 80% of patients with severe disease.

Orbital decompression surgery can be performed via multiple approaches including external, endoscopic and combined. Each approach has its advantages and disadvantages. Over the past 20 years endoscopic medial wall decompression has attracted proponents for providing improved visualization of the surgical field while allowing broad access to the entire medial orbital wall and medial orbital floor for decompression without the need for external incisions.

For the majority of patients undergoing orbital decompression surgery a single procedure is successful at relieving symptoms of TED. Persistent compressive symptoms may occur from inadequate removal of bony orbital walls or peri-orbita, with increased importance approaching the orbital apex. Recurrent symptoms may also relate to reactivation or progression of underlying Graves’ Disease.

Sphenoidomidal cells or Onodi Cells, are posterior ethmoid sinus cell pneumatizing superior and lateral to the front face of the sphenoid sinus, and may contribute to inadequate decompression. This anatomical configuration in particular may be more amenable to endoscopic than external approaches.

Methods and Materials

We report a retrospective case series of all revision orbital decompression cases performed by the Departments of Ophthalmology and Visual Science and Otolaryngology - Head and Neck Surgery at our institution over a 10 year period. This study received ethics approval by the hospital’s Institutional Review Board (approval #201401715).

The data were reviewed with respect to previously published recommendations for reporting outcomes of orbital decompression surgery. The parameters examined included: age, gender, laterality, indication for surgery, date of original surgery, preoperative visual acuity, preoperative proptosis, preoperative intraocular pressure, surgical technique, postoperative visual acuity, postoperative proptosis, postoperative intraocular pressure, presence of complications, status of postoperative diplopia and duration of follow-up.

Results

Patient Characteristics

Comparisons of Change in Proptosis

Comparisons of Change in Intraocular Pressure

26 revision decompression procedures were performed upon 19 patients. 6 Patients underwent bilateral procedures, 2 patients underwent further revision surgery. Other patient characteristics are listed in Table 1.

In all cases the indication for surgery was thyroid eye disease with evidence of complications despite nonsurgical management. These complications included compressive optic neuropathy (12 cases), or corneal exposure alone (14 cases).

Of these procedures, 21 were performed as “open” procedures, via a transconjunctival or transcaruncular approach. One patient also underwent subciliary incision for access in the setting of previous transcaruncular surgery.

Of these 5 patients, 3 underwent combined endoscopic and transconjunctival or transcaruncular approach to the medial orbital wall only. 1 patient underwent transcarnctural decompression of the orbital floor medial to the infraorbital nerve as part of the same procedure.

1 patient underwent wholly endoscopic medial orbital decompression.

Combined, combined approach surgery was used to ensure adequate decompression of the orbital apex and to allow optimal visualization at the conclusion of surgery.

In the majority of cases the visual acuity before surgery was between 20/20 and 20/30 and there was no change following surgery. In 5 cases the visual acuity improved > 1 line on a Snellen Chart. No patient had a visual reduction > 1 line on a Snellen chart.

There were no specific intraoperative complications identified. In 17 cases post-operative diplopia was present. For 14 patients strabismus surgery was performed to improve this diplopia. Diplopia was documented as being present in 16 cases before surgery. In 15 (94%) of these cases the diplopia persisted or worsened after surgery. There was a single case of new onset diplopia following revision decompression surgery. Although there was a trend towards diplopia being more prevalent following endoscopic surgery (5 of 5 cases, p=0.07) in all 5 cases diplopia was also present before surgery. There were no other surgical complications.

Discussion

Orbital decompression surgery is an uncommon procedure with high success rates and a favorable complication profile. Due to the overall success of primary surgery the need for revision procedures is uncommon.

A variety of nonsurgical treatment options are becoming available for treatment of TED. These include selenium for mild TED, which may prevent progression to more severe forms, and immunotherapy, such as anti-CD 10 monoclonal antibodies (rituximab) or anti-tumor necrosis factor alpha monoclonal antibodies (etanercept). Over time these may further decrease the numbers of patients requiring revision surgery or indeed primary operative intervention.

Complications seen in revision surgery would be expected to mirror those in primary surgery. As patients undergoing revision surgery may be more likely to have more severe disease, an increased rate of prior radiotherapy and be of advanced age, complication rates may be higher. Revision surgery, particularly in an irradiated field would be expected to be more challenging than primary surgery.

The rate of post-operative diplopia in this patient group was higher than other studies at 17 (65%). In 15 (88%) of these cases there was diplopia before surgery, resulting from the previous decompression procedure or underlying disease or both. The rate of new onset diplopia 2/10 (20%) is comparable with previous studies.

From these data it is unlikely that preoperative diplopia would improve with revision decompression surgery, and patients should be made aware that strabismus surgery is eventually required in greater than half (54%) of those patients indicated for revision decompression surgery.

Combined medial and lateral wall surgery for balanced decompression, offers favorable post-operative diplopia rates in primary surgery. For revision surgery the aim is to target the area of ongoing compression with removal of residual restrictive bone and peri-orbitala. When endoscopic medial wall revision decompression is indicated this is performed as combined team, combined approach surgery, using image guidance which we believe facilitates optimal decompression of the orbital apex. For example, image guidance is helpful in revision procedures with non -- decompressed sphenoidomidal (Onodi) cells (Figures 5.6).

In the majority of cases the visual acuity before surgery was between 20/20 and 20/30 and there was no change following surgery. Although there was an improvement in visual acuity in 5 patients with compressive optic neuropathy, in the remainder the acuity stabilized. A moderate percentage (42%) noticed improved vision, with the trend being for stabilization of disease.

Conclusions

Revision orbital decompression is an uncommon procedure indicated for those patients with progressive symptoms previous surgery and prior intensive medical management. Both endoscopic and non-endoscopic techniques offer favorable outcomes with comparable complication rates.

References