

## **Research Article**

# **Successful treatment of recurrent dysthyroid optic neuropathy following medical decompression**

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**Abstract:** To document the successful treatment of patients with recurrent dysthyroid optic neuropathy (DON) by medical decompression. We presenting a case of 60 year-old Malay lady have been diagnosed to have thyrotoxicosis with multi nodular goiter more than 10 years. During the course of illness she had multiple episodes of recurrent DON on both eyes. She was successfully treated with cortico-steroid therapy and regained back her previous good vision. Medical decompression with cortico-steroid gives good outcome even in patient with recurrent optic neuropathy.

**Keywords:** Thyroid eye disease, Optic neuropathy, Graves's disease

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## **INTRODUCTION**

Graves' orbitopathy or thyroid eye disease (TED) is an autoimmune disorder affecting 30% to 50% of patient with Graves' disease. It remains the commonest cause of unilateral and bilateral proptosis among adults [1]. Dysthyroid optic neuropathy (DON) occurs in approximately 5% of patients with thyroid orbitopathy [2]. Its potential complication can result in blindness. Women are five times more likely than men to get the disease and it significantly impaired the quality of life of affected patients [3]. The underlying pathophysiology and pattern of clinical manifestation vary widely among patients. Thus demands individual management for each patient when treating this serious and potentially debilitating condition. Once the diagnosis is establish it requires urgent treatment either with medical (eg: high-dose intravenous steroids) or surgical decompression to avoid permanent or progressive visual loss [4]. However, both of these treatment carry a considerable risk of failure and morbidity. Hence, it is essential the diagnosis is made correctly. We report a case of patient with recurrent episode of DON and each episodes of illness was successfully treated with medical decompression.

## **CASE REPORT**

Mrs. HA a 66 year old lady, non-smoker had been diagnosed to have thyrotoxicosis with multinodular goiter more than 10 years. She had undergone partial thyroidectomy 2 years after the

diagnosis. Post operatively, she was on oral carbimazole 5 mg bd and propranolol 20 mg daily. She presented to eye clinic with complaint of sudden onset worsening of vision in the left eye one week duration involving both near and distant visions. She also noticed worsening of protrusion in both eyes since few months back. She had on and off bilateral eye redness associated with tearing and foreign body sensations, which become persistent recently. Occasionally she also had mild eye pain aggravated by eye movement but absent of diplopia.

She had history of similar presentation in both eye few times since past 5 years and had been treated with corticosteroid in every episode of illness. Most of the time she regained backs her vision after completing courses of steroid. Last episode was about 1 year ago and completed the tapering dose of steroid within 4 months. She was on oral carbimazole 5 mg and oral propranolol 20mg but poor compliance to medication. Systemically patient had heat intolerance and generalized myalgia. She also had symptom of palpitation and tremor. There was no history of fever or symptom of systemic infection preceding the current illness. Otherwise, she had no other medical illness.

Examination revealed visual acuity was 6/9 on the right eye and 6/60 on the left side which improved to 6/36 with pinhole. Relative afferent pupillary defect (RAPD) was positive on the left eye. She scored 11/12

Ishihara colour plates with right eye and 6/12 with the left eye. There were bilateral axial proptoses. Hertel measurements were 22.5 mm and 24mm for the right and left respectively. She had bilateral lid retraction and lid lag. Extra ocular muscle movement was restricted especially on up-gaze bilaterally. The conjunctiva was injected and present of superficial punctate keratopathy in the inferior quadrant. The intraocular pressure in primary gaze was 22 mm hg right eye and 25mmhg left eye and increased to 30 mmhg and 36 mmhg for the right and left respectively in upward gaze. Funduscopy showed pink optic disc bilaterally and the cup disc ratio was 0.3 and was normal in appearance. Retinal view was normal in both sides.

General examination, patient was medium built, the blood pressure was 140 /80 mm Hg and the pulse rate 90 beats/min with regular rhythm. She had sweaty palms and mild intentional tremor. There was no pretibial oedema. Cardiovascular system examination revealed normal dual heart sound with no murmur. The thyroid gland was not palpable and present of transverse surgical scar on the neck.

Baseline investigation showed low serum T4 at level 3.0 mmol/l and high TSH which at 25.15 ulU/ml. CT scan of the orbits was done and showed proptosis of both eye with crowding of orbital apices by enlarged extra-ocular muscle particularly superior and

medial rectus which increased enhancement with relative sparing of the tendons.

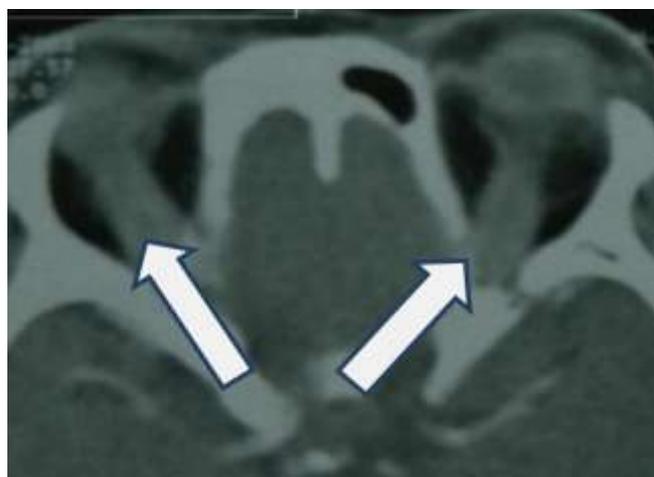
With the history of thyroid problem, optic nerve dysfunction and recurrent episode of similar problem the most likely diagnosis in this patient was recurrent DON. Patient was plan medical decompression.

Intravenous methylprednisolone 250mg was administered every six hours for three consecutive days. After the completion of intravenous, oral prednisolone 1mg/kg/day was administered for 1 week and tapered at 10 mg a week until a dose of 20mg was reached, then tapered by 5 mg every week. She also was started on topical anti-glaucoma (guttae timolol bd and dorzolamide bd) to control the intra-ocular pressure in both eyes. Improvement of visual acuity and color vision was noted after day three of IV methylprednisolone.

Three month post treatment, her vision stabilized at 6/9 in both eye and scored 10 of 12 Ishihara colour plates. Hertels reading were reduced to 22.5 mm in the left eye with minimal upgaze limitation. The intraocular pressure was under control with 2 type of topical anti-glaucoma (Guttae timolol 0.5% bd and Guttae dorzolamide 2% bd) for both eyes.



**Fig 1: Staring looking eyes and lid retraction**



**Fig-2: Enlargement of superior rectus muscle (arrow)**



**Fig-3: Enlargement of medial rectus muscle (arrow)**

### DISCUSSION

Thyroid eye disease (TED) presents as an incapacitating ocular disease, causing cosmetic disfigurement and functional deficits. It is the most frequent extra-thyroidal manifestation and clinically relevant in approximately 30% to 50% of patients with Graves' disease while severe forms with dysthyroid optic neuropathy (DON) affecting 4% to 8% of patients [1, 5]. It is an organ specific autoimmune disorder with production of auto antibodies against the thyroid stimulating receptor (the TSH receptor) which is expressed in both the orbit and the thyroid gland [6].

Several features are used to make the diagnosis of DON. The assumption is generally made that if any of these features are present in an individual with dysthyroid eye disease and no other explanation of the defect is apparent, then the individual has DON.

The large survey was done by the European Group on Graves' Orbitopathy (EUGOGO) to improve diagnostic accuracy for DON and they emphasized that the presence of other features of TED such soft-tissues signs, signs of clinical activity, proptosis or dysmotility does not help confirm or refute the diagnosis of DON, and indeed such features are not infrequently absent [7]. Optic disc swelling, impaired color vision and radiological evidence of apical optic nerve compression were frequently present when a diagnosis of DON was made. However from the survey, 55% of optic disc appearance was normal [7]. Proptosis measurements alone also did not correlate with the presence of DON. And they found many patients with DON were not significantly proposed. As in our patient, the optic disc was noted normal even though had few episode of recurrent attack. The combination of atrophy and swelling due to chronic optic nerve compression could conceivably result in normal appearance of optic disc.

In our case, patient had been diagnosed to have thyro toxicosis more than 10 years which is at the common age of presentation of thyroid

ophthalmopathy. She had undergone partial thyroidectomy and was on low dose tablet carbimazole post operatively. However with the history non-compliant to anti-thyroid she had few episodes of recurrent DON in the past. TED disease typically has active phase subsiding over one to two years (range 6 months to 5 years) into fibrotic, inactive phase. After the inflammation subsides, patient may suffer permanent structural changes around the eyes requiring treatment. Active inflammation recurs in about 1% of patient after months to years of inactivity [8]. Fortunately for our patient, she recovered well with minimal residual in each episode of illness and negative afferent papillary defect.

Direct compression of the optic nerve by pathologically enlarged extra-ocular muscle at the orbital apex is generally believed to produce optic neuropathy [9,10]. Patient with DON commonly demonstrate restriction of the inferior rectus muscle and associated increase in IOP in up gaze. In this patient, there is restriction in ocular movement and increased IOP in up-gaze which possible cause by congestion. Other causes which may explained this include an increase in adipose tissue with accumulation of glycosaminoglycan causing orbital apex compression, direct inflammation of optic nerve, vasculopathy with impaired blood supply to the optic nerve or nerve stretching secondary to severe proptosis [11].

In this current episode TSH was found to be on higher side with low serum T4. The relation between the treatment of hyperthyroidism due to Graves's disease and the course of Graves's ophthalmopathy is still controversial with conflicting result [12]. Anti-thyroid drug treatment appears not to be associated with the development or worsening of pre-existing eye disease [13]. The effect of thyroidectomy is less clear, but in general it probably does not induce or worsen eye disease. Several studies had however shown thyroidectomy was beneficial not only for control of the

hyperthyroidism, but at the same time stabilizes or even reverses thyroid associated eye disease [14].

In general, the treatment for thyroid eye disease occurs in two phases. The first phase involves treating the active eye disease and depends on the severity or activity of the disease. When sight threatened from optic neuropathy the “rescue” therapy (orbital decompression) is necessary to initiate alone or a combination. Orbital decompression is aimed at reducing the intra-orbital volume, and this can be carried out medically or surgically. Treatments that have proven to be beneficial in DON are systemic corticosteroid [15], orbital radiation [16], or surgical orbital decompression either by bone removal or fat removal [17].

For management of this patient, we employed intra venous methylprednisolone as the initial treatment followed with tapered dose of oral prednisolone. She demonstrated marked improvement in visual acuity and color vision after treatment. This treatment is effective for this patient in this current presentation and also in the previous episodes of DON. This supports the theory that optic nerve compression in the orbital apex and decreased optic nerve perfusion (cause by tight orbit) are the main mechanisms of optic nerve dysfunction in TED [18]. Previous report revealed improvement rates of 39% to 100% and remissions were maintained with oral prednisolone with or without orbital irradiation [19]. Our patient was stabilized with corticosteroids and remains stable without additional therapy.

Pulse methylprednisolone therapy may effectively inhibit inflammatory processes and provide a rapid means for achieving maximal visual recovery, which can be sustained using a tapering regimen of oral steroid and orbital irradiation [20]. The intravenous route delivers a higher cumulative dose of corticosteroid with fewer side effects than oral route [21]. Marcocci and colleague found DON improved in 11 of 14 patient receiving IV steroid vs 3 of 9 taking orally [22]. Improvement in symptoms generally occurs after 1 to 2 weeks of high dose intravenous glucocorticoids [23]. Rapid improvement in response to steroid warrant a trial of medical therapy with tapering of steroid over 6 weeks while close follow up is maintained.

Well known side effect, prolonged treatment with steroid is associated with significant morbidity; hence short term treatment is advocated. A close and careful evaluation of the patient should be made because steroid tapering may associated with rebound optic neuropathy. Alternatively, intra-orbital injection of steroid provides relief of symptoms with minimal systemic side effect [24]. In this case, intraocular pressure should be closely monitored as steroid can worsen the condition.

Radiation has been shown to be effective as oral steroid for treating optic neuropathy. It has more permanent effect and has gained wide acceptance as relatively non-invasive method of reversing DON. Patient who fail to respond to steroid or when contraindication exist, or in whom relapse occurs after completing radiation are considered for surgical decompression.

Orbital decompression has been a mainstay in historical treatment for TED in that it provides rapid and persistent relief of apical compression. Although surgical decompression of the orbit can be curative, previous report had shown cases with persistent sign of optic nerve dysfunction may require re-treatment with corticosteroid or radiation. It has been pointed out that decompression does not address the ongoing inflammation and consequently relapses may occur.

## CONCLUSION

Optic neuropathy manifest uncommonly in patient with TED. In this case report, pulse dose of corticosteroid gives good outcome even in patient with recurrent optic neuropathy.

## REFERENCES

1. Bartley GB; The epidemiologic characteristics and clinical course of ophthalmopathy associated with autoimmune thyroid disease in Olmsted County, Minnesota. *Trans Am Ophthalmol Soc* 1994. 92477–588.588
2. Lucarelli MJ, Shore JW; Management of thyroid optic neuropathy. *International ophthalmology clinics*, 1996 36(1), 179-193
3. Perros P, Crombie AL, Matthews JN, Kendall-Taylor P; Age and gender influence the severity of thyroid-associated ophthalmopathy: a study of 101 patients attending a combined thyroid-eye clinic. *Clin Endo crinol (Oxf)*. 1993; 38(4): 367–372.
4. Ebner R; Dysthyroid optic neuropathy. *Semin Ophthalmol* 2002. 1718–21.21
5. Neigel JM, Rootman J, Belkin RI et al.; Dysthyroid optic neuropathy; the crowded orbital apex syndrome. *Ophthalmology* 1988; 95: 1515–1521.152
6. Kendall-Taylor P, Crombie AL, Stephenson AM, Hardwick M, Hall K; Intravenous methyl prednisolone in the treatment of Graves’ ophthalmopathy. *Br Med J* 1988; 297:1574–1578.
7. McKeag D, Lazarus J H, Baldeschi L; Clinical features of dysthyroid optic neuropathy: a European Group on Graves’ Orbitopathy (EUGOGO) Survey. *Br J Ophthalmol* 2007. 91455–458
8. Krassas GE, Heufelder AE; Immunosuppressive therapy in patients with thyroid eye disease: an overview of current

- concepts. *European journal of endocrinology*, 2001; 144(4), 311-318
9. Kennerdell JS, Rosenbaum AE, El-Hoshy MH; Apical optic nerve compression of dysthyroid optic neuropathy on computed tomography. *Archives of ophthalmology*, 1981; 99(5), 807-809.
  10. Trokel SL, Jakobiec FA; Correlation of CT scanning and pathologic features of ophthalmic Graves' disease. *Ophthalmology*, 1981; 88(6), 553-564.
  11. Kazim M, Goldberg RA, Smith TJ; Insights into the pathogenesis of thyroid-associated orbitopathy: evolving rationale for therapy. *Archives of ophthalmology*, 2002; 120(3), 380-386.
  12. Burch HB, Wartofsky L; Graves' ophthalmopathy: current concepts regarding pathogenesis and management. *Endocr Rev* 1993; 14: 747-93.
  13. Prummel MF, Wiersinga WM, Mourits MP, Koornneef L, Berghout A, van der Gaag R; Effect of abnormal thyroid function on the severity of Graves' ophthalmopathy. *Arch Intern Med* 1990;150:1098-101
  14. Weber KJ, Solorzano CC, Lee JK; Thyroidectomy remains an effective treatment option for Graves' disease. *The American Jour of surgery*, 2006;191:400-405
  15. Claridge KG, Ghabrial R, Davis G, Tomlinson M, Goodman S, Harrad RA, Potts MJ; Combined radiotherapy and medical immunosuppression in the management of thyroid eye disease. *Eye*, 1997; 11(5), 717-722.
  16. Kinyoun JL, Kalina RE, Brower SA, Mills RP, Johnson RH; Radiation retinopathy after orbital irradiation for Graves' ophthalmopathy. *Archives of ophthalmology*, 1984; 102(10): 1473-1476.
  17. Hutchison BM, Kyle PM; Long-term visual outcome following orbital decompression for dysthyroid eye disease. *Eye*, 1995; 9(5), 578-581.
  18. Simon GB, Syed H, Douglas R, Schwartz R, Goldberg RA, McCann JD; Clinical manifestations and treatment outcome of optic neuropathy in thyroid-related orbitopathy. *Ophthalmic Surgery Lasers and Imaging*, 2006; 37(4): 284-290.
  19. Guy JR, Fagien S, Donovan JP, Rubin ML; Methyl prednisolone pulse therapy in severe dysthyroid optic neuropathy. *Ophthalmology*. 1989; 96: 1048-1052.
  20. Guy JR, Fagien S, Donovan JP, Rubin ML; Methyl prednisolone pulse therapy in severe dysthyroid optic neuropathy. *Ophthalmology* 1989;96:1048-52
  21. Rootman J; Diseases of the orbit: a multidisciplinary approach. 2nd ed. Philadelphia: Lippincott Williams & Wilkins; 2003; 182-96.
  22. Marcocci C, Cartagena L, Tanda ML; Comparison of the effectiveness and tolerability of intravenous or oral glucocorticoids associated with orbital radiotherapy in the management of severe Graves 'ophthalmopathy: results of a prospective, single-blind, randomized study. *J Clin Endocrinol Metab*. 2001;86(8):3562-3567
  23. Hart RH, Kendall-Taylor P, Crombie A, Perros P; Early response to intravenous glucocorticoids for severe thyroid-associated ophthalmopathy predicts treatment outcome. *J Ocul Pharmacol Ther*. 2005; 21(4): 328-336.
  24. Ebner R, Devoto MH, Weil D; Treatment of thyroid associated ophthalmopathy with periocular injections of triamcinolone. *Br JOphthalmol*. 2004;88(11):1380-1386.