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ORIGINAL ARTICLE

Management of optic neuritis in Ireland: a survey comparing the management practices of acute demyelinating optic neuritis amongst ophthalmologists and neurologists in Ireland

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Abstract

Background Acute optic neuritis (ON) is often the first manifestation of multiple sclerosis which is particularly common in Ireland. Despite the specific clinical details regarding investigations and management of ON provided by the Optic Neuritis Treatment Trial (ONTT), international surveys have shown that there are still notable differences in the management of ON between neurologists and ophthalmologists.

Aim To compare the investigation and treatment of acute optic neuritis between ophthalmologists and neurologists in Ireland

Method A survey consisting of a case scenario and questions regarding treatment and investigations of a patient with ON was emailed to ophthalmology consultants, trainees and medical ophthalmologists registered with the Irish College of Ophthalmologists and to neurology consultants and registrars registered with the Irish Institute of Clinical Neuroscience.

Results One hundred sixty recipients responded out of 350 (46%). The majority of the neurologists would initiate steroid treatment regardless of the patient's vision (75%), treat with 1 g IV methylprednisolone (100%) for 5 days (57%), perform an MRI brain and orbits with contrast (92%) and multiple laboratory tests (96%). In contrast, the ophthalmologists tended to initiate treatment depending on the patient's vision (48%), treat with 1 g IV methylprednisolone (97%) for 3 days instead of 5 days (93%), perform MRI brain and orbits with contrast (73%) and favour electrophysiology testing (73%) over laboratory testing (68%).

Conclusions Overall, most respondents would follow the ONTT guidelines regarding IV methylprednisolone. There was a significant difference in responses between the ophthalmologists and neurologists regarding who to treat, duration of treatment and appropriate investigations.

Keywords Demyelination · Ireland · Multiple sclerosis · Optic neuritis

Introduction

Acute demyelinating optic neuritis is an inflammatory condition affecting the optic nerve and a common cause of visual deficit in young adults typically between 18 and 45 years of age. More importantly, it is quite often the first manifestation of multiple sclerosis (MS). MS is particularly common in Ireland with an incidence of 290 new cases annually and prevalence varying throughout the country from 73 to 290.3/100,000 people [1, 2]. The risk of developing multiple sclerosis following an episode of acute demyelinating optic neuritis is as high as 70% depending on various clinical parameters as defined by the Optic Neuritis Treatment Trial (ONTT) [3–7]. Furthermore, the ONTT is a landmark clinical trial in defining a specific clinical profile of patients with demyelinating optic neuritis. In this trial, patients with acute optic neuritis were randomly assigned to three different treatment groups: (i) a 3-day course of IV methylprednisolone given in a dose of 250 mg every 6 h followed by 11 days of daily oral prednisolone in a dose of 1 mg/kg/day, and a quick taper (ii) oral prednisolone alone in a dose of 1 mg/kg/day for 2 weeks and (iii) placebo. They also underwent standardised unenhanced brain MRI scans, and the number of T2 white matter abnormalities characteristic of a demyelinating event was determined by using a standardised grading protocol.

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These patients were followed up for 15 years and have provided a vast amount of data over the years as well as important unanticipated findings.

The most significant findings with regard to treatment, investigation and prognosis of optic neuritis include the following: (i) a faster recovery and reduced risk of recurrence of a second demyelinating event consistent with MS at 2 years, following the use of IV methylprednisolone with a short course of oral prednisolone compared to oral prednisolone alone or placebo. Furthermore, their results revealed that patients treated with oral prednisolone alone had a higher rate of new attacks of optic neuritis than in the IV methylprednisolone group or placebo within the first 5 years of follow-up. (ii) The risk of subsequent MS can be reliably estimated by MRI imaging at the time of acute optic neuritis and it is the single most important predictor of risk of developing MS at 15 years. The presence of even a single characteristic T2 white matter abnormality on MRI imaging more than doubles the future risk of MS. (iii) Acute management with high-dose IV corticosteroids accelerates the visual recovery (including visual acuity, visual fields and contrast sensitivity) compared to oral prednisolone and placebo following acute optic neuritis and lowers the rate of development of MS at 2 years. However, it has no effect on the final visual outcome or on the development of MS by 5 years.

These findings have had a major impact on the treatment of optic neuritis which commonly involves both ophthalmologists and neurologists. Despite many years of widespread evidence-based medicine and practice guidelines, treatment and investigation protocols can still vary between different practitioners. A large number of international surveys regarding the treatment of acute isolated optic neuritis have shown varying management practices amongst ophthalmologists and neurologists [8–11]. No such survey has looked at the investigation and treatment practices of acute isolated optic neuritis in Ireland, a country known to have a relatively high incidence of optic neuritis and multiple sclerosis.

Aim

The aim of this study was to compare the investigation and treatment of acute optic neuritis between consultant ophthalmologists, trainees and medical ophthalmologists with consultant neurologists and trainees in Ireland.

Method

An online anonymous questionnaire was designed consisting of 14 questions regarding the treatment and initial investigations of a 25-year-old Irish Caucasian female presenting with a typical case of acute onset retrobulbar optic neuritis.

A link to the online survey was emailed via the Irish College of Ophthalmologists (ICO) to all ophthalmology consultants, trainees and medical ophthalmologists registered with the ICO ($n = 270$) and via the Irish Institute of Clinical Neuroscience (IICN) to neurology consultants and trainees registered with the IICN ($n = 80$). Informed consent was obtained in the email and email addresses were only accessible to the ICO and IICN.

The link was emailed over three separate occasions over a 2-month period. The questionnaire consisted of 14 multiple choice questions addressing a range of details regarding treatment and investigation of the patient (see questionnaire attached in Appendix).

Compliance rates and comparison between the ophthalmology trainees, consultants and medical ophthalmologists (ophthalmology group) vs. neurology trainees and neurology consultants (neurology group) were undertaken using mainly descriptive statistics. For further statistical analyses, categorical data was converted into two groups of numerical categories and compared using Mann Whitney *U* test results.

Results

The overall response rate was that of 46%, 161 recipients responded out of the 350 recipients. There was a 41% response rate in the ophthalmology group compared to 64% in the neurology group (Figs. 1 and 2 summarise the breakdown of responses between consultants and trainees).

With regard to treatment of the clinical case of acute retrobulbar optic neuritis, 75% of the neurology group would initiate IV methylprednisolone treatment regardless of the

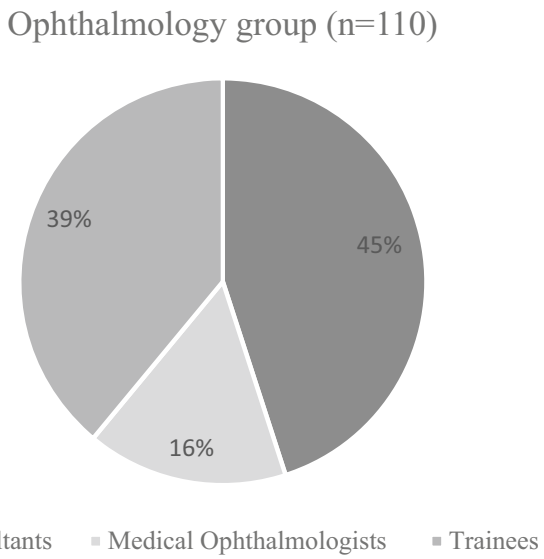

Fig. 1 Pie chart displaying breakdown of response rate in the ophthalmology group. Overall, there was a 41% response rate (110 responses/270 recipients)

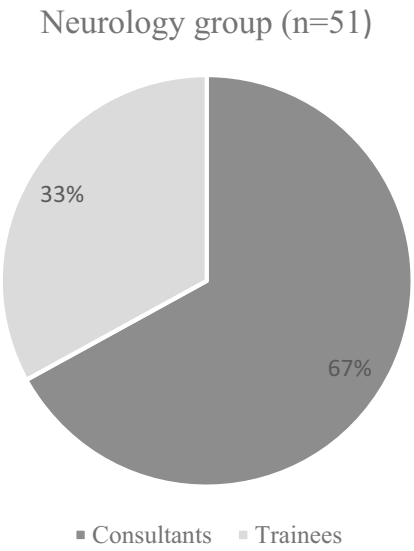

Fig. 2 Pie chart displaying breakdown of response rate in the neurology group. Overall, there was a 64% response rate (51 responses/80 recipients)

patient's visual acuity at presentation in contrast to the ophthalmology group who would elect to initiate treatment depending on the level of visual acuity decrease (48%) or not initiate steroids at all (10%). All respondents (100%) in the neurology group and almost all respondents in the ophthalmology group (97%) opted to treat with IV methylprednisolone as opposed to oral prednisolone. Similarly, both groups opted for a once-daily dosage as opposed to twice- or four-times-daily dosage in 98% of neurologists and 83% of ophthalmologists.

There were statistically significant differences between both groups with regard to the duration of therapy and tapering regime of IV methylprednisolone. Fifty-seven percent of the neurology group and 93% of the ophthalmology group opted for 3 days IV methylprednisolone, whereas 43% of the neurology group and 2% of the ophthalmology group opted for 5 days ($p < 0.001$). Following the initial treatment with IV methylprednisolone, 63% of the ophthalmologists and 18% of neurologists opted for 11 days of 1 mg/kg oral prednisolone followed by a taper; meanwhile, the rest of respondents would either taper over 11 days or less with oral prednisolone or not taper at all ($p < 0.005$, see Table 1).

With regard to which investigations would be routinely performed for the case in question, most of the neurology group (92%) and the ophthalmology group (73%) opted for an MRI brain and orbits with contrast. Neurology favoured laboratory investigations including lumbar puncture in 96%, in contrast to the ophthalmology group who opted for electrophysiological testing including visual evoked potentials, electroretinography and visual field testing in 76%. Electrophysiology was favoured in 43% of the neurology group.

The final part of the questionnaire addressed whether the doctor would inform the patient of the risk of multiple sclerosis and whether they would institute and direct treatment independently. Options were given to institute and direct treatment independently or refer onwards for treatment or treat but with further support from either another discipline or a consultant supervisor, the latter being especially applicable to trainee respondents.

Results revealed that the majority in both groups (83% of ophthalmologists and 94% of neurologists) would inform the patient regarding the risk of multiple sclerosis. Treatment would be instituted and directed independently by 40% of neurologists, the remainder either instituting treatment but also referring to neuro-ophthalmology (35%) or treating under supervision of a consultant (25%). Conversely, only 10% of the ophthalmology group would institute and direct treatment independently, the rest opting to institute treatment but also refer to either neurology or neuro-ophthalmology (45%) or treat under consultant supervision (34%) or not treat at all and refer onwards (11%) (see Table 1).

Discussion

Gratifyingly, in contrast to previous surveys which quoted up to 15 to 20% of ophthalmologists and neurologists still prescribing low-dose oral steroids for acute onset optic neuritis [10, 11], in our survey, all respondents in the neurology group and all but one respondent in the ophthalmology group would follow the ONTT guidelines and prescribe IV methylprednisolone instead of 1 mg/kg oral prednisolone.

Most respondents in both groups chose to give IV methylprednisolone once daily as opposed to four times a day as per the ONTT guidelines. This is likely as a result of patient and practitioner convenience of administrating the IV methylprednisolone as a day case procedure rather than as a hospital inpatient.

There is a notable difference between the two groups with regard to methylprednisolone treatment duration (over 3 days vs. 5 days), tapering regime (11-day oral 1 mg/kg vs. quick taper over 11 days vs. no taper) and initial radiological, laboratory and electrophysiological investigations.

The ophthalmology group favoured treatment according to visual acuity and is more closely adherent to the ONTT protocol of IV methylprednisolone over 3 days with an 11-day 1 mg/kg oral prednisolone dose followed by a quick taper; meanwhile, the neurology group seems to treat the patient as they would treat any other demyelinating event secondary to a flare up of multiple sclerosis regardless of the visual acuity and the ONTT protocol. Reasons for this may relate to the differences between the two specialties with regard to treatment goals and ongoing investigations within their discipline. Unsurprisingly, the ophthalmologists seem more focused on visual deficit and whether a specific treatment protocol is warranted for altering the speed of recovery and overall visual prognosis; meanwhile, the neurologists seem more focused on treating the

Table 1 The table below summarises the main differences between the ophthalmology group and the neurology group. It is not a complete representation of the all the multiple choice answers from the survey. The multiple choice answers representing the largest differences are listed below along with their corresponding percentage of respondents selecting that option for each group. The alternative options for which the percentage response has been omitted are represented in brackets. Statistically significant differences have been indicated by their corresponding *p* values

	Ophthalmology (%)	Neurology (%)	
Initiate steroid regardless of visual acuity (vs. tailored to visual acuity)	42	76	$p < 0.001$
No steroid treatment	10	0	
Inpatient admission (vs. day case)	56	31	
IV methylprednisolone (vs. oral)	97	100	
IV once daily schedule (vs. twice daily or four times a day)	83	98	
3 days IV methylprednisolone (vs. 5 days vs. other)	93	57	
5 days IV methylprednisolone	2	43	$p < 0.001$
Following IV treatment, 11 days 1 mg/kg oral then taper	63	18	$p < 0.005$
No taper (vs. quick taper over 11 days)	7	51	
Gastric protection	91	92	
Calcium supplements	65	59	
MRI brain and orbits with contrast	73	92	
MRI brain and orbits	15	8	
CT brain and orbits	12	0	
Chest X-ray (vs. no chest X-ray)	7	18	
Laboratory investigations (vs. none)	68	96	
Electrophysiology (vs. none)	76	43	
Inform the patient regarding possible MS	85	94	
Treat independently	10	40	
Treat with supervisor	34	25	
Treat with neuro-ophthalmology or neurology opinion	45	35	
Not treat, refer	11	0	

acute episode like they would for any other demyelinating event and investigating for MS.

These results are mirrored in other surveys, where neurologists were much more likely than ophthalmologists to treat with IV methylprednisolone regardless of the visual acuity [8, 10, 11]. In one of the surveys [10], steroids were still being given reasons other than shortening the duration of visual symptoms and fewer ophthalmologists than neurologists considered shortening the duration of visual symptoms to be very important.

With regard to investigation of optic neuritis and in keeping with the results of previous surveys, the ONTT and advancements in MRI technology with the use of contrast enhancement to indicate active inflammation, MRI brain and orbits with contrast is now the optimum standard of care in Ireland for the investigation of optic neuritis. This was reflected in the results as the majority of the respondents in both groups opted for an MRI brain and orbits with contrast (73% of the ophthalmology group vs. 92% of the neurology group). The differences between the two groups were not statistically significant.

Although the neurology group tends to favour multiple laboratory testing including lumbar puncture over electrophysiology which was favoured more by the ophthalmology group who are likely to be more involved with the patient's visual function, the differences between the two groups were not statistically significant. These differences although not statistically significant are again likely to do with the perception particularly amongst neurologists, of optic neuritis being part of a demyelinating event requiring a full range of investigations beyond the initial diagnosis as the presence of demyelination will require long-term treatment and follow-up. The neurology group was more likely to treat the patient independently rather than refer onwards and thus was more likely to obtain a lumbar puncture and further investigations which will be required for the commencement of disease-modifying agents if indicated.

Conclusion

This survey has shown that the vast majority of ophthalmology and neurology respondents who would treat the patient in the clinical scenario proposed would follow the ONTT guidelines with regard to intravenous methylprednisolone vs. oral prednisolone. There were however clinically and statistically significant differences in the responses between the two groups regarding who to treat, when to treat, the duration of initial treatment with IV methylprednisolone and the oral tapering regime upon completion of initial treatment. There were also various differences amongst the two groups with regard to relevant investigations in the acute stage. National practice guidelines combining the investigations,

management and referral of patients with optic neuritis between ophthalmologists and neurologists in Ireland would be useful, to optimise patient care and hospital resources.

Limitations

The overall response rate (46%) is comparable with similar international surveys [8–11]. A broad base of practitioners in the ophthalmology and neurology fields was surveyed. The recipients were from practices covering varying levels of sophistication from level 3 to level 4 hospitals and private and public health clinics. This may limit comparisons as the different levels of expertise and exposure have not been accounted for during the data analysis. Results may reflect an idealised management for these patients instead of true practices. There is also an element of non-response bias as no data was available to account for the non-responders.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants and/or animals This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from all individual participants included in the study and identifiable data remained anonymous throughout the study.

Appendix

Questionnaire

A 25 year old Irish Caucasian female presents with acute unilateral loss of vision with pain on eye movements. She has no previous ophthalmic history or medical history and is on no medication. You make the diagnosis of a first episode of *Acute Retrobulbar Optic Neuritis*.

Please answer the following questions regarding the treatment of this patient

1) At what visual acuity would you initiate steroids in this patient?

   ○ Better than 6/24
   ○ 6/24 – 6/60
   ○ Less than 6/60
   ○ I would initiate steroid treatment regardless of the visual acuity
   ○ I would not initiate steroid treatment for this patient

2) Would you routinely:

   ○ Treat as an inpatient
   ○ Day services administration of treatment as an outpatient
   ○ Treat solely as an outpatient

3) What would be your preferred route and dose of initial steroid therapy?

   ○ 1g IV Methylprednisolone
   ○ 1mg/kg per os prednisolone
   ○ No steroid treatment
   ○ Other steroid regime (please specify)

4) Initial steroid treatment routinely given for:

   ○ 3 days
   ○ 5 days
   ○ More than 5 days

5) Your preferred dosing schedule for IVI Methylprednisolone:

   ○ Once daily
   ○ 500mg 12 hourly
   ○ 250mg 6 hourly

6) Regarding per os steroid following initial treatment:

   ○ Taper to a complete stop in 11 days
   ○ Continue 1mg/kg po prednisolone for 11 days then taper
   ○ No per os steroid after initial treatment
   ○ Other (please specify)

7) Would you prescribe gastric protection?

   ○ Yes
   ○ No

8) Would you prescribe calcium supplements?

   ○ Yes
   ○ No

9) Which radiological investigations would you routinely order for this case? (multiple options allowed)

   ○ CT brain and orbits
   ○ CT brain and orbits with contrast
   ○ MRI brain and orbits
   ○ MRI brain and orbits with contrast
   ○ Chest Xray
   ○ None

10) Which laboratory investigations would you routinely order for this case? (multiple options allowed)

○ Lumbar puncture
○ Full blood count
○ Urea and electrolytes
○ ESR and CRP
○ Syphillis serology
○ Thyroid function tests
○ Borrelia burgdorferi
○ HSV
○ TB
○ HIV
○ Autoimmune screen
○ NMO antibody
○ None

11) Regarding electrophysiology and field testing, which would you routinely order for this case?

○ Visual evoked potential (VEP)
○ Electroretinogram (ERG)
○ Humphrey visual fields (HVF)
○ Goldmann perimetry
○ None

12) Would you mention the possible diagnosis of Multiple Sclerosis to the patient?

○ Yes
○ No

13) What is your current professional status?

○ Consultant Neurologist
○ Neurology trainee
○ Consultant Ophthalmologist
○ Medical Ophthalmologist
○ Ophthalmology trainee

14) Would you treat this patient?

○ Yes, I would treat this patient
○ Yes, I would treat this patient but request an opinion from a Neuro-Ophthalmologist
○ Yes, I would treat this patient but request an opinion from a Neurologist
○ Yes, I would treat this patient but request an opinion from a Neuro-Ophthalmologist and a Neurologist
○ Yes, but under supervision as I am a trainee
○ No, I would refer to a Neuro-Ophthalmologist
○ No, I would refer to a Neurologist
○ No, I would refer to a Neuro-Ophthalmologist and a Neurologist

Note: respondents that selected 'I would not initiate steroid treatment for this patient' for the first questions were allowed to skip to the investigations section (question 9) of the questionnaire.

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