ORIGINAL ARTICLE

Acute and subacute inflammation of the optic nerve and its sheath: clinical features in Chinese patients

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Objective Inflammation of the optic nerve (optic neuritis) and its sheath (optic perineuritis) can have similar initial clinical presentations. They are less well-defined in the Chinese than in Caucasians, and the aetiology of optic neuritis may also differ depending on ethnicity. The aim of our study was to document the clinical features of acute/subacute optic neuritis/optic perineuritis in Chinese patients.

Design Retrospective case series.

Setting Hong Kong Eye Hospital, Hospital Authority.

Patients Records of all patients presenting to the Hong Kong Eye Hospital between 2005 and 2008, with their first episode of optic neuritis/optic perineuritis with onset of symptoms within 30 days, were reviewed.

Main outcome measures Disease aetiology, clinical features and outcomes.

Results Twenty-nine patients were included (M:F=13:16), with a mean age of 46 years at presentation. Among these, 25 had optic neuritis and four had optic perineuritis; four presented with bilateral optic neuritis. Among the optic neuritis group, 17 (68%) were idiopathic, seven (28%) were related to multiple sclerosis, and one (4%) had neuromyelitis optica. Poor visual outcome in the optic neuritis group was associated with poor visual acuity at presentation and poor visual acuity at the nadir.

Conclusion Optic perineuritis and neuromyelitis optica–related optic neuritis were more commonly encountered in our study of Hong Kong Chinese patients than in Caucasian populations. Even in Chinese patients with 'typical' optic neuritis, neuro-imaging and further investigations may be warranted to exclude optic perineuritis/neuromyelitis optica, since Chinese ethnicity is itself an atypical feature. Where neuro-imaging is not readily available, intravenous methylprednisolone may be considered as initial treatment to cover both optic neuritis/optic perineuritis in patients with severe visual loss.

New knowledge added by this study

- Optic neuritis and optic perineuritis may have similar initial clinical presentations.
- Optic perineuritis and neuromyelitis optica–related optic neuritis were more commonly encountered in our Hong Kong Chinese patients than Caucasians.

Implications for clinical practice or policy

- Even in Chinese patients with 'typical' optic neuritis, neuro-imaging and further investigations may be warranted to exclude optic perineuritis and neuromyelitis optica, since Chinese ethnicity is itself an atypical feature.
- Where neuro-imaging is not readily available, intravenous methylprednisolone may be considered as initial treatment to cover both optic neuritis and optic perineuritis for patients with severe visual loss.

Key words
Multiple sclerosis; Optic nerve; Optic neuritis; Visual acuity

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Introduction

Inflammation of the optic nerve (optic neuritis [ON]) and its sheath (optic perineuritis [OPN]) are inflammatory optic neuropathies characterised by visual disturbances with signs of optic nerve dysfunction. The initial clinical presentation of OPN may mimic that of demyelinating ON and cause diagnostic confusion.[1] Radiologically, ON is characterised by contrast enhancement of the optic nerve, or in the case of OPN, its surrounding

視神經及其鞘的急性與亞急性炎症：華裔患者的臨床特徵

目的 視神經及其鞘的炎症（即分別為視神經炎及視神經束膜炎）病發時可能有類似的臨床症狀，而華裔患者的症狀描述不及白種人患者般明確。視神經炎的華裔患者也可能有不同的病因。本研究旨在探討視神經炎及視神經束膜炎的華裔患者，其急性與亞急性炎症的臨床特徵。

設計 病例系列回顧研究。

安排 醫院管理局轄下的香港眼科醫院。

患者 2005年至2008年期間所有首次因視神經炎或視神經束膜炎而到香港眼科醫院求診的病人，他們均於病發30日內求診。

主要結果測量 病因、臨床症狀及治療結果。

結果 共29名病人（13男16女）被納入研究範圍，求診時的平均年齡46歲。其中25人患有視神經炎（4名病人涉及雙眼），另4人患有視神經束膜炎。視神經炎患者中，17人（68%）屬原發性、7人（28%）與多發性硬化症有關、1人（4%）有視神經脊髓炎。視神經炎患者較差的視力結果與病發時較差視力和較差最低點視力有關。

結論 與白種人的患者比較，香港華裔患者較常見有視神經束膜炎以及與視神經脊髓炎有關的視神經炎。由於華裔本身是一個非典型特徵，縱使華裔病人呈視神經炎的「典型」臨床症狀，都要考慮為他們進行神經影像及進一步的檢查以否定視神經束膜炎或視神經脊髓炎。假如未能迅速為病人進行神經影像，可考慮為嚴重視力喪失患者先施以靜脈注射內甲基潑尼松龍，以同時涵蓋視神經炎和視神經束膜炎。

perineurium, and may show features associated with the underlying cause of the inflammatory optic neuropathy.

Optic neuritis has been extensively studied in Caucasians, including in the Optic Neuritis Treatment Trial (ONTT),[2] which included 457 patients (85% Caucasians) followed up for 15 years.[3-5] In 50% of the patients, there was associated multiple sclerosis (MS).[4] In Asian populations, however, ON has been less well-studied,[6] especially in the Chinese. The few available previous reports were either heterogeneous (with multiple ethnicities included) or included patients with both first and recurrent presentations of ON.[7-10]

Optic perineuritis is a form of idiopathic orbital inflammatory disease (IOID) specifically affecting the optic nerve sheath.[1,11] Since it is uncommon and in the past it was probably underdiagnosed,[1] its epidemiology is not well-documented in the literature. From our own clinical experience, however, it appears that OPN may be more common in the Chinese.

The aim of the current study was to describe disease aetiologies, clinical features and outcomes in Chinese patients presenting with their first episode of acute/subacute ON or OPN. The findings were then compared to available data from other populations.

Methods

This retrospective case series study was conducted at the Hong Kong Eye Hospital (HKEH), which provides primary, secondary, and tertiary ophthalmic care to a population of about one million, after obtaining approval from the local ethics committee. Records of Chinese patients presenting to the general and neuro-ophthalmology clinics of HKEH between January 2005 and December 2008, with a first episode of ON or OPN within 30 days of symptom onset and at least 3 months of follow-up, were reviewed. All patients had visual disturbance (impaired vision/colour vision, visual field defect) in one or both eyes and a relatively afferent pupillary defect if unilaterally affected. Other causes of optic neuropathy including compressive, ischaemic, toxic, metabolic, infiltrative, traumatic, and hereditary were excluded (based on the history, clinical presentation, investigations, and disease course). The HKEH is a publicly funded institution and the availability of prompt neuro-imaging, especially magnetic resonance imaging (MRI), is limited. Therefore neuro-imaging was judiciously performed in selected cases only. Demographic data, clinical features, investigation results and outcomes were recorded. Data were then compared to that available for other populations.

The diagnosis of MS was based on the revised McDonald criteria published in 2005.[12] Neuromyelitis optica (NMO) was diagnosed according to the Wingerchuk criteria revised in 2006.[13] Optic perineuritis was defined as an optic neuropathy with possible presence of orbital signs (eg proptosis, extraocular movement deficits or ptosis), together with supportive radiographic features. On MRI, these features include contrast enhancement of optic nerve sheath with or without enhancement of surrounding orbital fat. The features on computed tomography (CT) include prominence and enhancement of the optic nerve and/or perineural tissues, and streaky enhancement of the surrounding orbital fat. A prompt and dramatic clinical response (<24 hrs) to steroids was also strongly supportive of the diagnosis of OPN.[1]

Visual acuity (VA) was measured on a Snellen decimal scale and converted to the logarithm of minimal angle of resolution (LogMAR) units for calculation. Conversion of counting fingers and hand motion vision to LogMAR VA was performed according to suggestions by Holladay[14]: counting fingers were given a LogMAR value of 2 and hand motion was given a value of 3. Eyes with light

perception and no light perception were excluded from calculation of mean VAs.[14]

Statistical analyses were performed with the Statistical Package for the Social Sciences (version 16.0; SPSS Inc, Chicago [IL], US). Independent sample *t* tests or Mann Whitney *U* tests were used to compare continuous variables between groups as appropriate. Fisher's exact test was used for comparison of discrete variables between groups. Binary logistic regression was used to identify factors associated with poor visual outcome (VA, <0.1) at final follow-up (mean, 23 months; range, 7-52 months). Factors included in the regression analysis were age, gender, VA at presentation, VA at nadir, presence of pain at presentation, optic disc swelling, type of ON, type of treatment, and recurrence of ON. For all statistical analysis, a P value of <0.05 (two-sided) was considered statistically significant.

Results

In all, 29 patients with ON/OPN fulfilled our inclusion criteria, of whom 16 (55%) were female. Their mean age at presentation was 46 (range, 15-78) years. Four patients presented with bilateral involvement. The mean duration of symptoms from onset to presentation was 8 (range, 1-30) days, and the mean duration of subsequent follow-up was 23 (range, 7-52) months.

Among these patients, 25 (86%) had ON and 4 (14%) had OPN; 4 who had bilateral symptoms were subsequently diagnosed to have ON. Compared to patients with ON, OPN tended to occur in older subjects; the mean difference in ages approached statistical significance (P=0.08). Table 1 shows the characteristics of patients with ON and OPN.

Optic neuritis group

In the ON group (n=25), three (12%) of the patients had a previous diagnosis of MS at the time of presentation and did not undergo further neuro-imaging. Two (8%) patients had MRIs showing periventricular plaques and multiple demyelination in subcortical white matter; together with a previous history of other neurological attacks, leading to the diagnosis of MS-related ON. One of these two patients was also positive for lupus anticoagulant. One patient initially had MRI features suggesting acute disseminated encephalomyelitis, but subsequently developed recurrence of ON in the fellow eye and was finally diagnosed to have MS 16 months later. One other patient was subsequently diagnosed with MS. Another patient had a known history of previous acute myelitis, rheumatoid arthritis and Sjögren's syndrome, before she presented with ON. Her serum was also positive for anti-nuclear antibody (ANA), anti-extractable nuclear antigen antibodies (anti-Ro), anti-NMO, and anti-aquaporin antibodies.[4] She was subsequently diagnosed to have NMO according to the Wingerchuk criteria.[13]

Regarding the remaining 17 patients, one had an elevated serum ANA titre and another had an elevated rheumatoid factor titre and was weakly positive for anti-neutrophil cytoplasmic antibody. These two patients did not fulfil the diagnostic criteria of any specific rheumatological disease (as assessed by rheumatologists), and so were diagnosed to have idiopathic ON. No cases of infective ON were identified.

In our series, idiopathic and MS-related ON shared similar clinical features, except that the latter

TABLE 1. Characteristics of patients with optic neuritis and optic perineuritis*

Characteristic†	Optic neuritis	Optic perineuritis	P value (2-tailed)
No. of patients	25 (86%)	4 (14%)	-
No. of eyes	29	4	
Follow-up duration (months)	15 ± 13	13 ± 11	0.92‡
Mean age at presentation (years)	41 ± 19	57 (range, 43-77)	0.08‡
Male : female	11 : 14	2 : 2	1.00§
Time to presentation (days)	9 ± 8	4 ± 3	0.22‡
Bilateral presentation	4 (16%)	0	0.40§
Presenting VA (LogMAR)	1.2 ± 0.99	1.2 ± 1.3	0.98‡
Pain‖	8 (28%)	2 (50%)	0.37§
Optic disc swelling‖	7 (24%)	2 (50%)	0.28§
Presenting VA LP or worse‖	3 (10%)	0	1.00§

* Data are shown as No. (%) or mean ± standard deviation
† VA denotes visual acuity, and LP light perception
‡ Mann Whitney *U* test
§ Fisher's exact test
‖ % based on number of eyes

TABLE 2. Comparison of characteristics between different aetiologies of optic neuritis*

Aetiology of optic neuritis	Idiopathic	MS-related	NMO	P value† (2-tailed)
No. of patients	17 (68%)	7 (28%)	1 (4%)	-
No. of eyes	19	9	1	
Follow-up duration (months)	13.4 ± 10.6	20.6 ± 17.6	9	0.24‡
Age at presentation (years)	40.9 ± 21.8	36.7 ± 12.7	59	0.90‡
Male : female	8 : 9	3 : 4	F	1.00§
Time to presentation (days)	9.5 ± 8.2	8.0 ± 6.0	2	0.78‡
Bilateral presentation	2 (12%)	2 (29%)	NA	0.55§
Presenting VA (LogMAR)	1.5 ± 1.0	0.6 ± 0.6	0.7	0.03‡
Pain‖	7 (37%)	1 (11%)	No	0.21§
Optic disc swelling‖	4 (21%)	3 (33%)	No	0.65§
Presenting VA LP or worse‖	2 (11%)	1 (11%)	No	1.00§

* Data are shown as No. (%) or mean ± standard deviation; VA denotes visual acuity, LP light perception, MS multiple sclerosis, NMO neuromyelitis optica, and NA not applicable
† The calculation of P value did not include the NMO group with only one patient
‡ Mann Whitney *U* test
§ Fisher's exact test
‖ % based on number of eyes

had a statistically significant better VA (P=0.03) at presentation. Among the four patients presenting with bilateral ON, two were idiopathic and two were MS-related. Table 2 shows the presenting characteristics of patients with ON associated with different aetiologies.

Eleven ON patients (6 idiopathic, 4 MS-related, 1 NMO-related) received steroid therapy according to the protocol from the ONTT (3 days of intravenous methylprednisolone 1 g/day followed by 11 days of oral prednisolone 1 mg/kg/day),[5] followed by a tapering course of oral steroids. Another five patients (all idiopathic ON) were started on oral prednisolone (30-80 mg/day) elsewhere before presenting to our clinic. No steroid-related side-effects (in particular avascular necrosis of the hip and gastro-intestinal complications) were detected in patients in the current study. Nine patients in this series did not receive steroid therapy.

Optic perineuritis group

Among the four patients with OPN, none had documented orbital signs at their initial visit. One was subsequently noted to have 2 mm of proptosis. On the affected side, all four had varying degrees of optic nerve thickening and streaky orbital fat enhancement (dirty fat sign) revealed by contrast neuro-imaging (Fig a, i). One patient had an MRI showing classic perineural enhancement of the optic nerve sheath (Fig a, ii). No underlying infection or autoimmune disorder was identified in these patients, all of whom received the ONTT steroid regimen (see above), followed by a tapering course of the oral steroids lasting 4 to 16 weeks. Following such treatment, two patients responded very rapidly with significant improvement in VA within 24 hours; in the other two, treatment was delayed by 8 and 10 days, and the response was suboptimal. The proptosis noted in one of the patients also subsided during steroid treatment.

Visual outcome

Table 3 shows visual outcomes in affected eyes of patients with idiopathic ON, MS-related ON, and OPN. In the patient with NMO-related ON, her initial presenting VA was 0.2. With steroid therapy; it gradually improved to 0.5 and there was associated improvement of the visual field. Three ON patients (1 idiopathic and 2 MS-related) subsequently developed recurrent ON and had final VAs of less than 0.1 (Table 3).

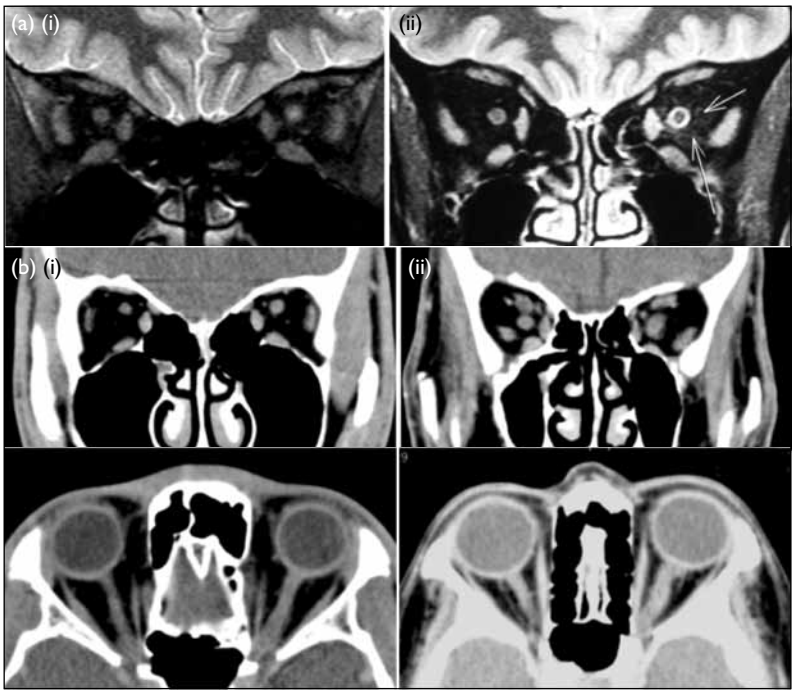

FIG. (a) Magnetic resonance imaging (coronal short TI inversion recovery images) of the orbit in patients with (i) left optic neuritis showing hyperintensity of the optic nerve, and (ii) left optic perineuritis showing perineural hyperintensity around the left optic nerve with dirty fat sign depicted with arrows. (b) Comparison of contrast computed tomographic images of patients with (i) optic neuritis and (ii) optic perineuritis. Coronal and axial scans of the patient with left optic neuritis show an enlarged and contrast-enhancing left optic nerve. In the patient with left optic perineuritis, there is streaky enhancement of perineural tissue (dirty fat sign) which is not evident in optic neuritis

Poor visual outcome in optic neuritis group

Regarding the 29 eyes with ON, binary logistic regression suggested that poor visual outcome (VA <0.1) was significantly associated with poor VA at presentation (P=0.04) and poor VA at nadir (P=0.02), whilst a trend of an association was also present with older age at presentation (P=0.07) and recurrence of ON (P=0.08). Poor visual outcome was not significantly associated (P>0.05) with gender, pain at presentation, optic disc swelling, type of ON, and type of treatment (Table 4).

Discussion

In OPN, there may be IOID-associated orbital signs in addition to the optic neuropathy. In cases where the orbital signs are absent or subtle, OPN may be clinically indistinguishable from ON initially (without contrast imaging of the orbit). However, distinguishing OPN from ON has important management and prognostic implications. For acute-onset ON, intravenous high-dose steroid treatment has been shown to hasten initial visual recovery, but did not affect the final visual outcome.[3] Therefore, some patients may be managed expectantly. On the other hand, early initiation of high-dose and prolonged steroid treatment for OPN is essential to prevent irreversible visual loss and recurrent attacks.[1] In our series, the poor visual outcomes in

TABLE 3. Number of patients in each visual acuity range at different times*

VA (Snellen)	At presentation	At nadir	Month 1	Month 3	Final FU (mean, 19.4 months)	Steroid regimen used†		
						ONTT	Nil	Oral
Idiopathic optic neuritis								
1.0 or better	-	-	3	2	5	2	1	2
<1.0 to 0.8	1	1	3	4	3	0	1	2
<0.8 to 0.5	1	1	6	8	7	3	2	2
<0.5 to 0.1	5	5	3	2	1	0	1	0
<0.1 to >CF	6	5	-	2	3 (1 recurrent)	2	1	0
CF	-	-	-	-	-	-	-	-
HM	4	2	-	-	-	-	-	-
LP	2	3	-	-	-	-	-	-
NLP	-	2	2	-	-	-	-	-
Total	19	19	17	18	19	-	-	-
MS-related optic neuritis								
1.0 or better	-	-	-	-	-	-	-	-
<1.0 to 0.8	-	-	3	3	4	2	2	0
<0.8 to 0.5	4	4	2	-	1	0	1	0
<0.5 to 0.1	3	1	2	-	1	0	1	0
<0.1 to >CF	1	1	1	-	2 (1 recurrent)	2	0	0
CF	-	1	-	-	1 (1 recurrent)	1	0	0
HM	-	-	-	-	-	-	-	-
LP	1	-	-	-	-	-	-	-
NLP	-	2	-	-	-	-	-	-
Total	9	9	8	3	9	-	-	-
Optic perineuritis								
1.0 or better	-	-	-	-	-	-	-	-
<1.0 to 0.8	-	-	1	1	2	2	0	0
<0.8 to 0.5	1	-	1	-	-	-	-	-
<0.5 to 0.1	1	1	-	-	-	-	-	-
<0.1 to >CF	1	-	-	1	1	1	0	0
CF	-	-	1	-	-	-	-	-
HM	1	1	-	-	-	-	-	-
LP	-	-	-	1	1	1	0	0
NLP	-	2	1	-	-	-	-	-
Total	4	4	4	3	4	-	-	-

* VA denotes visual acuity, CF count fingers, HM hand motion, LP light perception, NLP no light perception, FU follow-up, MS multiple sclerosis, and ONTT Optic Neuritis Treatment Trial regimen

† Corresponding to VA at final follow-up

two of our OPN patients were mainly attributed to delayed diagnosis and treatment before presentation to our clinic. In terms of prognosis, OPN is not associated with an increased risk of subsequent MS.[1] In Caucasian populations where ON is one of the commonest neuro-ophthalmologic conditions and OPN is considered uncommon,[1] neuro-imaging is not regarded as an absolute requirement in patients with typical ON features (eg young female, retrobulbar ON, pain with eye movement), especially where resources are limited.[11] In our series, 14% of the patients presenting with an acute/subacute ON-like picture actually suffered from OPN, which means OPN is an important differential diagnosis in the Chinese. When we encounter such patients clinically, orbital signs should be specifically looked for and there should be a very low threshold for neuro-imaging. In an ideal world, a prompt contrast MRI brain and orbit for every patient may facilitate the differentiation of ON and OPN considerably (Fig a), and help detect MS-related brain changes. In situations where MRI is not readily available, contrast CT of the orbit may also give a hint to the diagnosis of OPN, by showing prominence and enhancement

of the affected optic nerve and/or perineural tissues and streaky enhancement of the surrounding orbital fat (Fig b). In our series, contrast CT in three of the four patients with OPN showed enlarged and enhanced affected optic nerves and two showed streaky enhancement of the surrounding orbital fat; two were confirmed by subsequent MRI. Intravenous methylprednisolone (1 g daily) can be considered as initial treatment to cover for both ON and OPN. The speed of response to steroid can help distinguish the two conditions and act as a guide to future treatment.

TABLE 4. Results of binary logistic regression with dependent factor as poor visual outcome with visual acuity of <0.1 at final follow-up*

Factor	P value	OR	95% CI
Age at presentation	0.07	1.05	0.99-1.11
Gender	0.27	2.89	0.43-19.28
Pain at presentation	1.00	0	NA
Optic disc swelling	0.60	1.70	0.24-12.17
VA at presentation	0.04	1.82	1.003-3.31
VA at nadir	0.02	3.85	1.29-11.50
Type of ON (idiopathic vs MS-related vs NMO)	0.48	1.74	0.38-8.12
Type of treatment (ONTT vs oral steroid vs nil)	0.31	1.97	0.54-7.17
Recurrence	0.08	10.50	0.76-145.36

* VA denotes visual acuity, MS multiple sclerosis, NA not applicable, NMO neuromyelitis optica, ON optic neuritis, ONTT Optic Neuritis Treatment Trial regimen, OR odds ratio, and CI confidence interval

For the patients with ON, the main findings of our study compared to those in others are summarised in Table 5.[3-5,8-10,15-17] As in two other reports on Chinese patients,[7,15] our series had a slight female predominance (56%). In our Hong Kong Chinese population, ON tended to present later in life (mean age, 41 years) compared to the Caucasians described in the ONTT.[5] In our series, the age at presentation was similar to that reported in other Asian populations,[8,10,14,15] the single exception being the Chinese series described by Zhang et al[9] in which the mean age at presentation was 26 years.

In our ON group, 'idiopathic' ON remained the most common aetiology (as described in the Chinese[6]) and accounted for 68% of ON patients in our series, whereas 28% presenting with a first episode were related to MS. This is higher than the rates of 8.2 to 14.7% reported in two other Chinese series.[9,15] Recently, Lim et al[8] reported a similar MS rate (26%) to ours in Singaporean patients (72% were Chinese) who presented with ON. Nevertheless, the reported rates of MS in Asians were lower than those in Caucasians.[4,8-10,15,16] In our series, 2/20 (10%) patients without the diagnosis of MS at ON presentation developed MS during subsequent follow-up (over a mean of 2 years). This was comparable to the 14% MS development rate after 24 months in the ONTT (in which the patients were mainly Caucasians),[17] but higher than the 6% development rate in the Taiwanese series reported by Lin et al.[15]

TABLE 5. Comparison of clinical features of ON and its association with MS in different ethnic groups*

	Current study	Lim et al, 2008[8]	Zhang et al, 2007[9]	Lin et al, 2006[15]	Wang et al, 2001[10]	Wakakura et al, 1999[16]	ONTT[3-5,17]
No. at presentation / FU for MS development	25 / 20	55	98	109	31	70	448 / 389
Ethnicity							
Chinese	100%	72%	100%	100% (Taiwan)	71%	-	-
Indian	-	9%	-	-	3%	-	-
Malay	-	10%	-	-	26%	-	-
Others	-	9%	-	-	-	100% (Japanese)	85% (Caucasian)
Mean age (range) [years]	41 (14-77)	NR (12-70)	26 (6-55)	41 (7-80)	39 (11-67)	36 (14-55)	32 (18-46)
Female	56%	76%	54%	53%	38%	69%	77%
Pain	28%	71%	43%	59%	NR	56%	92%
Optic disc swelling	24%	60%	40%	53%	65%	50%	35%
MS (overall)	28%	26%	8%	15%	7%	6%	57%
At presentation of ON	20%	26%	NR	NR	-	NR	13%
Subsequent conversion							
At 2 years	10%	0%	-	6%	-	-	14%
At 15 years	-	-	-	-	-	-	50%
NMO	4%	NR	4%	-	NR	NR	NR

* FU denotes follow-up, MS multiple sclerosis, NMO neuromyelitis optica, ON optic neuritis, ONTT Optic Neuritis Treatment Trial, and NR not reported

It is estimated that NMO represents less than 1% of demyelinating disease of the central nervous system in Caucasians and it is suggested that it is more common in Asians.[18] In our series, one (4%) patient was diagnosed to have NMO. Zhang et al[9] reported a similar rate (4%) in her series of Chinese patients. No patients were diagnosed to have NMO-related ON among the 448 patients included in the ONTT.[4,5] It is important to consider NMO-related ON in Chinese patients presenting with ON, as the treatment would be long-term immunosuppression rather than immunomodulation as in MS.

Five patients (all with idiopathic ON) were started on oral steroids (equivalent to 30-80 mg prednisolone/day) before presenting to our clinic. In patients diagnosed with ON, oral steroids should actually be avoided since they are ineffective when used alone and may even increase the risk of new episodes.[5] Intravenous methylprednisolone may be given instead to hasten visual recovery. With the potential serious side-effects associated with high-dose systemic steroid therapy, some clinicians may opt not to give steroids for typical MS-related ON, particularly as it has been shown not to affect the final VA.[19] Potential side-effects of high-dose systemic steroids include avascular necrosis of the hip, gastro-intestinal complications (eg peptic ulcer, acute pancreatitis), Cushing syndrome and acute psychosis. In the ONTT however, major adverse events were uncommon with short-term glucocorticoid usage in young healthy adults.[20] In that trial, of the 151 patients randomised to receive intravenous methylprednisone, only two experienced major side-effects (psychotic depression and acute pancreatitis).

Six eyes with ON had poor final visual outcomes (VA <0.1), of which three had idiopathic disease and three were MS-related. Factors associated with poor final visual outcomes were poor VA at presentation (P=0.04) and poor VA at nadir (P=0.02), whilst associations with older age at presentation and recurrence showed trends (P=0.07 and 0.08, respectively). In our series, three patients had recurrent ON, all of whom had poor final visual outcomes (VA <0.1). Similarly, recurrent ON was associated with poorer visual outcomes in the ONTT.[19]

To our knowledge, our study is the first to use strict inclusion criteria (first episode of ON/OPN presenting within 30 days of symptom onset) in a homogeneous group of Chinese patients. We believe this is also the first study to include patients with OPN. This gives more diagnostic and prognostic information for Chinese patients presenting with acute/subacute ON-like features for the first time.

A limitation of our study was the small sample size (only 33 eyes in 29 patients). This may have resulted in type II errors; the near-significant age difference between the ON and OPN patients and association between poor visual outcome and recurrence of ON could be related to the small sample size. Furthermore, due to resource limitations in public hospital settings, MRIs were not performed in nine of the 29 patients. Regarding these nine patients, two had contrast CT, and one refused neuro-imaging; thus their diagnoses of ON/OPN were based on clinical grounds. Since this study was retrospective in nature, a further limitation was that investigations and follow-ups were not standardised. Another limitation was a possible bias towards patients with poorer visual outcomes, since we only included those with at least 3 months of follow-up; persons with good and rapid visual recovery may have been less inclined to return for follow-up. Finally, ophthalmic care in Hong Kong is also provided by private ophthalmologists, so that mild cases of ON may not have been referred to our hospital.

Conclusion

Optic perineuritis was an important differential diagnosis in our study population, accounting for 14% of patients presenting with acute/subacute ON symptoms. The rate of NMO-related ON in our series was 4% (similar to the rate previously reported in Chinese patients[9]), and this was probably higher than that in Caucasians, though such an inference based on a single case in a small sample may be misleading. Nevertheless, Chinese ethnicity may well be an atypical feature for ON. Therefore further careful clinical examination and workup seems appropriate to exclude the possibility of OPN and NMO-related ON in Chinese patients. To prevent irreversible visual loss, prompt high-dose intravenous steroid treatment should be considered if OPN and NMO-related ON are suspected.

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