Neuropathy in elderly: lessons learnt from nerve biopsy

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Abstract

Objective: To study the utility of nerve biopsy in providing diagnostic, therapeutic or prognostic information that aid in clinical management in elderly subjects with peripheral neuropathy.

Method: Clinico-pathological data of 100 elderly subjects aged 65 and above with peripheral neuropathy who underwent nerve biopsy in the last decade (2002–2011) was reviewed.

Results: The study included 100 subjects (M: F 78: 22). Mean age at biopsy and symptom duration was 69.62 ± 4.8 years and 24.17 ± 40.4 months, respectively. The most common pattern of was distal symmetric sensorimotor polyneuropathy (35%), followed by multiple mononeuropathy (29%) and asymmetric sensorimotor neuropathy (15%). The nerve biopsy was ‘diagnostic’ in 24% (definite vasculitis in 12, leprosy in 10 and acute inflammatory demyelinating polyradiculoneuropathy in 2) and proved ‘essential’ or ‘helpful’ in therapeutic management in 81% subjects. In 60 (60%) patients, where a pre-biopsy aetiological diagnosis could be arrived at based on the available data, nerve biopsy confirmed the diagnosis in 29 of 60 (48.3%), and offered a new diagnosis in 25 (41.7%). A higher yield of biopsy was noted in subjects with asymmetric/multiple mononeuropathy compared with symmetric neuropathies (32.7% versus 17.7%). In 40 (40%) patients without a pre-biopsy aetiological diagnosis, nerve biopsy was ‘essential’ in 7 of 40 (17.5%) as it provided a definitive diagnosis (definite vasculitis: 5, leprosy: 2), and ‘helpful’ in 21 of 40 (52.5%) (ischaemic neuropathy: 10, possible vasculitis: 9, probable vasculitis: 2).

Conclusion: Nerve biopsy aided in the detection of potentially treatable disorders and influenced patient management in a significant proportion of elderly subjects with peripheral neuropathy (81%), particularly in subset with undiagnosed neuropathies confirming that it’s a useful tool in diagnosis of neuropathy in the elderly. With minor differences, the aetiological profile in our biopsied neuropathic elderly subjects may reflect the findings in other similar cohorts.

Keywords: elderly neuropathy, nerve biopsy, vasculitis, diabetes, leprosy, older people

Introduction

Peripheral neuropathy is one of the challenging diagnosis encountered by a neurologist with an estimated prevalence of 2–8% in the general population [1]. The incidence of peripheral neuropathy increases with age, commensurate with ‘ageing’ of the peripheral nervous system and the high prevalence of systemic disorders like diabetes mellitus [2]. Increased morbidity and impaired quality of life in elderly with peripheral neuropathy is recognised [3]. The aetiology of neuropathy in elderly is varied, and the leading causes include vasculitis, diabetes, alcohol and nutritional deficiencies [4–6]. The diagnostic work up needs to be tailored to each individual patient based on the bedside history and examination, topographic pattern and evolution of clinical symptoms and signs.

Nerve biopsy is frequently performed as a part of the diagnostic evaluation of a patient with peripheral neuropathy. A thorough clinical and laboratory evaluation can establish the aetiological diagnosis without resorting to biopsy in a significant proportion of cases [7]. Newer tests have not only reduced the proportion of ‘undiagnosed’ or ‘idiopathic’ neuropathies but also the reliance on nerve biopsy for establishing an aetiological diagnosis. However, in resource restricted settings, nerve biopsy, being an inexpensive investigation, remains the key investigation in several centres, despite being an invasive procedure that can produce long-term complications in a significant proportion of patients [8]. Besides, the diagnostic yield varies from 24 to 94% different settings depending on availability of sophisticated techniques for enhancing the yield [4, 7].

Studies evaluating spectrum of peripheral neuropathy in the elderly are few in the published literature [4–6]. In this
study, we review the clinico-pathological data of 100 elderly subjects with peripheral neuropathy who were evaluated over the last decade at our Institute. This study focused on the indication for nerve biopsy in elderly patients, its utility in providing additional diagnostic, therapeutic or prognostic information that aided in clinical management.

Patients and methods

Patient selection

This study was carried out at the Department of Neurology and Neuropathology, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore. It included all subjects aged 65 and above who underwent nerve biopsy between January 2002 and December 2011. The study was approved by the Institute Ethics Committee. Details of clinical symptomatology, neurological deficits and electrophysiological abnormalities were obtained by retrospective chart review. A family history of neurological disease, presence of co-morbidities and toxin exposure, if any, was also noted. The progression of symptoms was classified as acute, subacute or chronic when the duration of progression <4 weeks, 4–8 weeks or >8 weeks, respectively. Results of laboratory investigations like haemogram (including haemoglobin, total leucocyte count and platelet count), erythrocyte sedimentation rate, biochemical parameters, serological tests, analysis of cerebrospinal fluid, neuroimaging and other tests were recorded wherever available. Electrophysiological tests were carried out using standard protocols and at least one motor and one sensory nerve each in the upper and lower limbs were examined [9]. A value beyond 2SD of the established laboratory control data was considered abnormal. The clinical and electrophysiological observations were used to categorise patients into symmetric or asymmetric, sensory or motor or sensorimotor polyneuropathy, multiple mononeuropathy, polyradiculoneuropathy and mixed patterns. All the medical case records were reviewed by two authors (A.L. and M.N.) and the best possible pre-biopsy diagnosis was assigned with the available clinical data and laboratory investigations. In case of conflict, a consensus was arrived at by discussion with the other author (A.B.T). Pre-biopsy diagnosis was revised if necessary.

Nerve biopsies

The nerve biopsies were fixed in 2.5% glutaraldehyde, and a portion was processed for paraffin embedding. A second portion was prefixed in Fleming’s solution and processed for Kulchitsky Pal stain for myelin. Longitudinal and transverse sections, of 3 μm thickness was serially cut and stained with Hematoxylin-Eosin, Masson’s Trichrome for collagen and Kulchitsky Pal for myelin. Additionally, Periodic Acid Schiff, Congo red and Perls Prussian Blue stain were carried out for detecting paraprotein/immunoglobulin, amyloid and haemosiderin deposits, respectively. Immunohistochemistry by indirect immunoperoxidase method was carried out in selected cases, using antibodies to leukocyte common antigen (monoclonal, 1 : 100, Biogenex, Fremont, California, USA) to detect inflammatory infiltrates. Semithin sections, electron microscopy and teased fibre preparation was not carried out due to lack of easy availability of these techniques at our centre.

All nerve biopsy specimens were systematically reviewed by a single neuro-pathologist (A.M) who was provided limited clinical information. The following parameters were assessed: subperineurial oedema, myelinated fibre loss, acute myelin/axonal breakdown, demyelination, axonal regeneration, inflammatory cell infiltrate and vascular alterations. The histopathological diagnosis was confirmed or revised based on the current established pathological criteria and correlated with treatment instituted to determine utility in clinical management.

Utility of nerve biopsy in diagnosis

Nerve biopsy findings were classified as ‘diagnostic’ in the presence of specific histopathological findings that permitted a definitive diagnosis, even in the absence of clinical details. They were classified as ‘non-diagnostic’ in the absence of specific findings that permitted unequivocal diagnosis on histopathology alone and required correlation with clinical features to arrive at a diagnosis.

Utility of nerve biopsy in Management [7, 10] was then assessed, and biopsies were categorised as ‘essential’, ‘helpful’ or ‘no value’. The final aetiological diagnosis was determined by correlating the clinical, electrophysiological, laboratory and histopathological findings. The contribution of nerve biopsy in establishing a specific diagnosis was evaluated (Supplementary data, Appendix available in Age and Ageing online).

Results

Clinical profile

During the study period, 107 elderly subjects underwent nerve biopsy at our centre. Seven patients were excluded due to the non-availability of medical case records in six and insufficient nerve biopsy material in one. The clinical, demographic details and pattern of peripheral nerve involvement are summarised in Table 1. The symptom onset was in the lower limbs in 77, upper limbs in 19 and simultaneous in upper and lower limbs in 3. One patient had symptom onset in the cranial nerves. The onset was acute in 12, sub-acute in 9 and chronic in 79. Majority of the patients had sensory symptoms in the form of paraesthesias (n = 75) and impaired sensation (n = 85). The pre-biopsy diagnosis included vasculitis (n = 22), leprosy (n = 9), diabetic neuropathy (n = 7), acute inflammatory demyelinating polyneuropathy (AIDP) (n = 8), chronic inflammatory demyelinating polyneuropathy (CIDP) (n = 5), paraneoplastic (n = 3), nutritional deficiency (n = 3), toxic (n = 2) and motor neuron disease (MND) (n = 1). In the remaining 40 subjects, an aetiological diagnosis could not be arrived at prior to nerve biopsy and were labelled ‘undiagnosed’.

Neuropathological findings

The nerve biopsied was (i) sural nerve (n = 82), (ii) dorsal cutaneous branch of ulnar nerve (n = 9), (iii) cutaneous
Utility of nerve biopsy in diagnosis and management

The nerve biopsy was ‘diagnostic’ in 24, and the diagnostic biopsies included definite vasculitis (n = 12), leprosy (n = 10) and AIDP (n = 2). These biopsies were ‘essential’ for the patient’s management. An additional 57 biopsies were ‘helpful’ and included probable vasculitis (n = 10), possible vasculitis (n = 24), ischaemic neuropathy (n = 17), IDP (n = 4), and demyelinating neuropathy without inflammation (n = 2). The remaining biopsies which were of ‘no value’ showed chronic axonopathy (n = 18) and ischaemic neuropathy (n = 1).

Clinico-pathological correlation

The pre- and post-biopsy diagnosis is given in Table 2. In 60 patients, a pre-biopsy aetiological diagnosis could be arrived at based on the available clinical and laboratory data. In the majority, the biopsy was ‘contribute’ and confirmed the pre-biopsy diagnosis in 29, while offering a new diagnosis in 25. The biopsy showed only chronic axonopathy in six patients and was thus ‘non-contributory’.

Vasculitis was the commonest indication for biopsy in 22 patients. Biopsy confirmed the diagnosis in 15 patients, while the remaining cases revealed ischaemic neuropathy (n = 3), leprosy (n = 1), chronic axonopathy (n = 2) and demyelinating neuropathy (n = 1). An additional 31 patients were diagnosed as vasculitis based on the histological findings (Table 2). Two patients had concomitant rheumatoid arthritis and one patient had systemic sclerosis. Serological evidence of systemic auto-immune involvement was found in 11 patients (anti-nuclear antigens in six, rheumatoid factor in two and ANCA in three). Of these, one patient diagnosed with Churg Strauss syndrome revealed necrotising vasculitis, with fibrinoid necrosis and transmural inflammation of large calibre vessels in epineurium with numerous eosinophils (Supplementary data, Figure S1A, B available in Age and Ageing online). Microvasculitis, with inflammation around small calibre epineurial vessels was seen particularly in case of HIV vasculitis (Supplementary data, Figure S1C available in Age and Ageing online).

Table 1. Clinical, electrophysiological and pathological features in elderly with peripheral neuropathy (n = 100)

<table>
<thead>
<tr>
<th>M : F</th>
<th>78 : 22</th>
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<tbody>
<tr>
<td>Mean age at biopsy</td>
<td>69.62 ± 4.8 years (range: 65–85 years)</td>
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<tr>
<td>Symptom duration</td>
<td>24.17 ± 40.4 months</td>
</tr>
<tr>
<td>Clinical course</td>
<td>Relapsing-remitting: 12, Progressive: 88</td>
</tr>
<tr>
<td>Clinical features</td>
<td>Paraesthesias: 75/87 (86.2%), Trophic ulceration: 7/15 (46.7%), Impaired sensation: 85/99 (85.9%), Sensory ataxia: 15/58 (25.9%), Wasting: 39/62 (61.3%), Weakness: 79/97 (81.4%), Thickened nerves: 17/50 (34%)</td>
</tr>
<tr>
<td>Electrophysiology</td>
<td>Axonal pattern: 64, Mixed demyelinating and axonal pattern: 36, Conduction blocks: 6</td>
</tr>
</tbody>
</table>
| Patterns of neuropathy | Distal symmetric sensorimotor polyneuropathy: 35, Multiple mononeuropathy: 29, Asymmetric sensorimotor neuropathy: 15, Symmetrical sensory neuropathy: 4, Asymmetrical sensory neuropathy: 1, Motor neuropathy: 1, Others:

Table 2. Correlation of pre- and post-biopsy diagnosis in elderly (n = 100)

<table>
<thead>
<tr>
<th>Pre-biopsy diagnosis</th>
<th>Post-biopsy diagnosis</th>
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<tbody>
<tr>
<td>Vasculitis</td>
<td>22</td>
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<tr>
<td>Chronic axonopathy</td>
<td>6</td>
</tr>
<tr>
<td>Ischaemic neuropathy</td>
<td>3</td>
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<tr>
<td>Probable vasculitis</td>
<td>1</td>
</tr>
<tr>
<td>Leprosy</td>
<td>2</td>
</tr>
<tr>
<td>Probable vasculitis</td>
<td>1</td>
</tr>
<tr>
<td>Diabetic</td>
<td>7</td>
</tr>
<tr>
<td>Possible vasculitis</td>
<td>3</td>
</tr>
<tr>
<td>Hansen’s disease</td>
<td>1</td>
</tr>
<tr>
<td>Guillain–Barre syndrome</td>
<td>8</td>
</tr>
<tr>
<td>Possible vasculitis</td>
<td>2</td>
</tr>
<tr>
<td>Chronic axonopathy</td>
<td>2</td>
</tr>
<tr>
<td>Ischaemic neuropathy</td>
<td>1</td>
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<tr>
<td>IDP</td>
<td>2</td>
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<tr>
<td>CIDP</td>
<td>5</td>
</tr>
<tr>
<td>Chronic axonopathy</td>
<td>2</td>
</tr>
<tr>
<td>Nutritional</td>
<td>3</td>
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<tr>
<td>Ischaemic neuropathy</td>
<td>2</td>
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<tr>
<td>Toxic</td>
<td>2</td>
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<tr>
<td>Paraneoplastic</td>
<td>3</td>
</tr>
<tr>
<td>Definite vasculitis</td>
<td>1</td>
</tr>
<tr>
<td>IDP</td>
<td>1</td>
</tr>
<tr>
<td>Motor neuron disease</td>
<td>1</td>
</tr>
<tr>
<td>Undiagnosed</td>
<td>40</td>
</tr>
<tr>
<td>IDP</td>
<td>1</td>
</tr>
<tr>
<td>Ischaemic neuropathy</td>
<td>10</td>
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<tr>
<td>Chronic axonopathy</td>
<td>12</td>
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<tr>
<td>Leprosy</td>
<td>2</td>
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<tr>
<td>Possible vasculitis</td>
<td>2</td>
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<tr>
<td>Leprosy</td>
<td>2</td>
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</table>
Eight patients with a pre-biopsy diagnosis of AIDP who were subjected to nerve biopsy showed IDP (n = 2), vasculitis (n = 3), chronic axonopathy (n = 2) and demyelination without inflammation (n = 1). In five patients with suspected CIDP, nerve biopsy revealed definite vasculitis (n = 1), possible vasculitis (n = 2) and ischaemic neuropathy (n = 1). An inflammatory demyelinating pathology was detected in only one patient in whom nerve biopsy revealed endoneurial inflammation with several de/re-myelinating fibres (Supplementary data, Figure S1D, E available in *Age and Ageing* online). Biopsy findings of IDP were detected in an additional three patients with a clinical diagnosis of diabetic neuropathy (n = 2) and MND (n = 1).

Leprosy was the biopsy diagnosis in 10 patients. The diagnosis was suspected clinically in six patients. The typical features of leprosy on biopsy included presence of multiple well-formed epithelial granulomas with no detectable lepra bacilli in the tuberculoid end of spectrum (BT, n = 4) (Supplementary data, Figure S1F available in *Age and Ageing* online). While cases of lepromatous leprosy demonstrated infiltration of the endoneurial compartment with foamy histiocytes and numerous lepra bacilli within the foam cells (BL, n = 5 and BB, n = 1) (Supplementary data, Figure S1G, H available in *Age and Ageing* online). In three other patients in whom leprosy was suspected clinically, nerve biopsy revealed possible vasculitis, ischaemic neuropathy and chronic axonopathy in one patient each.

Forty patients did not have a pre-biopsy aetiological diagnosis. In these, the biopsy was ‘diagnostic’ and ‘essential’ in 7 (definite vasculitis: 5, leprosy: 2), and ‘helpful’ in 21 (ischaemic neuropathy: 10, possible vasculitis: 9, probable vasculitis: 2). The remaining 12 showed chronic axonopathy and were of ‘no value’. These patients remained aetiologically undiagnosed even after nerve biopsy.

A ‘diagnostic’ biopsy was noted in 16 of 49 patients (32.7%) with either multiple mononeuropathy or asymmetric neuropathy in contrast to, only 8 of 45 with symmetrical neuropathy who had a ‘diagnostic’ biopsy (17.7%). Nerve biopsies proved to be ‘essential’ or ‘helpful’ in greater proportion of patients with asymmetric neuropathy or multiple mononeuropathy (41 of 49, 83.7%) compared with symmetrical neuropathies (35 of 45, 77.8%).

**Neuropathy in elderly with diabetes**

Twenty-seven patients had concomitant diabetes mellitus. Four were detected diabetes at the time of evaluation for peripheral neuropathy. Diabetic neuropathy was considered in only seven patients. In the rest, alternative diagnoses of vasculitis (n = 6), leprosy (n = 3), CIDP (n = 3), GBS (n = 1) and MND (n = 1) and undiagnosed aetiology (n = 6) were considered. The biopsy diagnosis was definite vasculitis (n = 4), probable vasculitis (n = 2), possible vasculitis (n = 6), ischaemic neuropathy (n = 6), IDP (n = 4), Hansen’s disease (n = 2) and chronic axonopathy (n = 3). Ischaemic neuropathy was considered in the presence of marked endoneurial microangiopathic changes with endoneurial fibrosis consequent to fibre loss (predominantly small fibre) that was in characteristic sectoral pockets reflecting ischaemia (Supplementary data, Figure S1J available in *Age and Ageing* online). No inflammation was recognizable.

Biopsy concordance was highest in clinically suspected vasculitis (68.1%) followed by IDP (23.07%) and lowest in nutritional neuropathies.

**Discussion**

Elderly are at an increased risk for polyneuropathy [11, 12]. Several studies have addressed the epidemiology, aetiology, quality-of-life and clinico-pathological correlation of neuropathy in elderly [2, 4, 5, 11, 12, 13–16]. These studies are varied in the operational definition of neuropathy, investigative tools and study settings. Community-based epidemiological studies have primarily focused on distal symmetrical sensory or sensorimotor neuropathy in order to avoid mimickers like stroke, injuries, etc., and improve inter-rater reliability. Diabetes is the leading cause of neuropathy in such studies that have focused on distal symmetrical neuropathy in elderly [4, 13, 17–19]. The current study is a hospital-based study that included only those patients who underwent nerve biopsy for the evaluation of peripheral neuropathy. Although the commonest pattern was distal symmetrical sensorimotor neuropathy (n = 35), a significant number of patients had multiple mononeuropathy (n = 19) or asymmetric polyneuropathy (n = 15), and the commonest aetiologial diagnosis was vasculitic neuropathy (46%) which is in line with other hospital-based studies [4, 5].

The diagnostic utility of nerve biopsy in peripheral neuropathies in general has been assessed and varies from 24 to 94% in different studies [7, 20–22]. In the current study, nerve biopsy was ‘diagnostic’ in 24%. In terms of management, the biopsy proved ‘essential’ in 24% and ‘helpful’ in 57%. Argov et al. studied the diagnostic utility of sural nerve biopsy in 120 patients with peripheral neuropathy. Nerve biopsy contributed to a final diagnosis 38%, and altered the management in 50% [20]. Other studies have shown that a diagnosis can be established by nerve biopsy alone in 24–47.3% [7, 10, 21, 22]. Gabriel et al. concluded that sural nerve biopsy altered the diagnosis in 14%, confirmed the suspected diagnosis in 70% and was non-contributory in 16%. In the same study, nerve biopsy affected the therapeutic management in 60% of patients [23]. Thus, the indication for performing nerve biopsy needs to be balanced against the expected diagnostic yield vis-à-vis procedural complications [8].

Fewer studies have focused on the utility of nerve biopsy in the elderly population with variable findings [4, 5]. Chia et al. showed a very high yield of nerve biopsy and concluded that a definite diagnosis could be arrived at in 94% of the subjects by combining clinical and histological data [4]. Karatziou et al. in a study of 74 elderly subjects reported that nerve biopsy changed the previously preferred diagnosis in 7.4%, and established the suspected diagnosis in 15.4%, while 12.2% showed only unexplained axonal neuropathy [5]. In the current study, which focussed on neuropathy in the elderly, it was noted that majority had treatable causes of neuropathy.
confirmed the pre-biopsy diagnosis in 29 subjects, altered the diagnosis in 25 and was ‘non-contributory’ in six. Interestingly, in 40 patients were ‘undiagnosed’ for aetiology, nerve biopsy was essential or helpful in 28 subjects (vasculitis in 16; ischaemic neuropathy in 10 and leprosy in 2), amenable to treatment.

Several clinical and neuro-pathological factors affect the diagnostic yield of nerve biopsy [7]. The pre-biopsy presumptive diagnosis of vasculitis, inflammatory demyelinating disease or hereditary motor sensory neuropathy is considered to be associated with a better yield [7]. In the current study, the commonest pre-biopsy diagnosis was vasculitis (n = 22), and biopsy concordance was highest in this group (68.1%). The site of biopsy may also determine the diagnostic yield. Peroneal nerve is the most frequently affected in vasculitic neuropathy, while the sural nerve is the commonest to be biopsied in clinical practice, including the present study [7, 13, 24–26]. Combined biopsy of the superficial peroneal nerve and peroneus tertius muscle increases the diagnostic yield of vasculitis [7, 24, 26]. Although teased fibre preparation is recommended for assessment of myelin abnormalities, additional critical information is obtained in only a small proportion of patients [7]. This could not be carried out in the current study. Three patients in the current study with a pre-biopsy diagnosis of nutritional neuropathy were found to have vasculitic (n = 1) or ischaemic neuropathy (n = 2). Thus, nutritional deficiency may be a confounding factor and warrants a search for other causes of neuropathy in the elderly.

Leprous neuropathy was seen in 10 patients in our study. This is higher than that reported in other studies of neuropathy in elderly, and reflects endemicity of the disease [4–6]. Diagnosis was unsuspected in four of these patients and biopsy confirmed the pre-biopsy diagnosis in only six of nine patients. The presence of painful neuropathy, impaired proprioceptive sensations and symmetric pattern of neuropathy may prompt a clinician to consider diagnosis other than leprosy [27]. Over-reliance on the classical signs in Hansen’s disease such as trophic changes, thickened nerves and preserved reflexes may lead to misdiagnosis.

Diabetes is the commonest cause for peripheral neuropathy in the community [6, 12, 13] and was a common co-morbidity in the current study. Diabetic polyneuropathy per se does not warrant a nerve biopsy for establishing the diagnosis. In the current study, nerve biopsy was performed in patients with clinical features that suggested an alternative diagnosis. Nerve biopsy demonstrated ischaemic neuropathy in six patients attributable to the effect of diabetes on the peripheral nerve vasculature. Baring these and three other patients who demonstrated chronic axonopathy, nerve biopsy was ‘essential’/‘helpful’ in therapeutic management in the rest. This is higher than that reported by Chia et al. wherein severe axonopathy and vasculitis was seen in four and two patients with diabetes, respectively [4]. This may be related to the patient selection.

Nerve biopsy is more likely to be useful in multiple mono-neuropathies or in the setting of markedly slowed motor nerve conduction velocities [7, 20, 22]. In the current study, ‘diagnostic’ yield was higher in patients with multiple mononeuropathy and asymmetric neuropathies (32.7 versus 17.7%). ‘Essential’ and ‘helpful’ biopsies were also higher in patients with multiple mononeuropathy and asymmetric neuropathies (83.7%). The higher yield in multifocal and asymmetric neuropathies may be related to the high proportion of vasculitis in these patients [7].

In the current study, we found that a small proportion of patients showed only chronic axonopathy and nerve biopsy did not provide any clue to the aetiology, similar to other studies that have demonstrated that the aetiology of neuropathy remains undiagnosed in 10–20% of patients even after extensive evaluation [28], particularly in those who have axonal polyneuropathy. This entity has been termed as ‘chronic idiopathic axonal polynyropathy’ (CIAP) or ‘cryptogenic sensory polyneuropathy’. The incidence of CIAP increases with age. Verghese et al. found that 9% of the young old had idiopathic neuropathy in contrast to 39% of the old-old [6]. This disorder presents with an insidious onset, slowly progressive distal symmetrical sensory or sensorimotor symptoms in the sixth decade, and is not associated with severe disability or impaired mobility even 5–10 years into the disease process [28–31]. This reflects the incomplete understanding of the mechanisms of neuropathy in elderly that remain to be uncovered.

This study is a hospital-based retrospective study that included only those elderly patients who underwent nerve biopsy for the evaluation of neuropathy. While these results may not reflect the profile of neuropathy in the community at large, we believe that our observations are comparable with the experience in other tertiary care referral centres where only a select population with neuropathy is subjected to nerve biopsy as a part of the aetiological work up. The pre-biopsy work up for neuropathy was not uniform limited by financial constraints of patients. Teased fibre preparation was not available which precluded a definitive diagnosis of CIDP. Nevertheless, this study which is one of the largest provides important insights into the utility of nerve biopsy in elderly neuropathy in resource restricted settings. Nerve biopsy was ‘essential’ or ‘helpful’ in 81% of patients. It aided the detection of potentially treatable disorders and guided patient management including a subset of ‘undiagnosed’ neuropathies and must be included in the armamentarium of diagnostic modalities for peripheral neuropathies in the elderly.

Key points

- Nerve biopsy ‘contributed’ to therapeutic management in majority of elderly with neuropathy.
- Biopsy confirmed pre-biopsy diagnosis in 48.3% and offered new diagnosis in 41.7%.
- Biopsy yield was higher in asymmetric/multiple mononeuropathy.
- Vasculitis was the commonest biopsy diagnosis.
- Notably, while 40% were aetiologically undiagnosed pre-biopsy, only 12% remained ‘idiopathic’ after nerve biopsy.
Conflict of interest

None declared.

Supplementary data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

References

The most important references are listed here and are represented by bold type throughout the text. The full list of references is available on Supplementary data in *Age and Ageing* online.


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