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CASE STUDY

ROLE OF HIGH RESOLUTION SONOGRAPHYIN ASSESSING NERVE DAMAGE IN LEPROSY PATIENTS

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ABSTRACT

Introduction: leprosy is the most common treatable peripheral nerve disorder. As high resolution sonography provides objective measurements of nerve thickening, we used it to demonstrate nerve enlargement in leprosy patients.
Aim and objectives: The aim of the study was to assess the usefulness of high resolution sonography in assessing nerve damage in leprosy patients
Materials and methods: We performed bilateral high resolution sonography of ulnar, median and common fibular nerves in 20 leprosy patients and 20 healthy controls.
Results: The nerves were significantly thicker in the leprosy patients as compared to healthy controls ($p<0.0001$ for each nerve)
Conclusion: High resolution USG is useful in early diagnosis of leprosy neuropathy.

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INTRODUCTION

Leprosy also known as Hansen's disease is a chronic infective granulomatous disease caused by mycobacterium leprae. The disease predominantly affects the skin and peripheral nerves resulting in functional impairment, ulcers and deformities. Although the prevalance of leprosy has reduced over the past few decades, it still remains a major public health problem in developing countries. (WHO 2011) Leprosy has a wide clinico-pathological spectrum (Ridley and Jopling, 1966) which includes localisedtuberculous form (TT) at one end to generalisedlepromatous leprosy (LL) at the other end of the spectrum. In between the two, are unstable forms of borderline tuberculous (BT), borderline borderline (BB) and borderline lepromatous leprosy (BL). Involvement of various nerves may be present in all these forms of leprosy and is responsible for ulcer formation and stigmatizing deformities which from the most feared consequences of the disease. In addition, the leprosy reactions (type1and type 2) can cause acute neuritis and severe morbidity. Clinical examination of nerves in leprosy patients is subjective and inaccurate and for some nerves this is daunting because of their location deep between the fascial planes. (Wilder- Smith and VanBrakel, 2008) Nerve conduction studies and various imaging studies like high resolution ultrasound (HR- USG) and magnetic resonance imaging (MRI) have been used to assess nerve impairment in leprosy patients. Although nerve conduction studies provide information regarding nerve dysfunction, it doesn't provide any information regarding nerve thickening and fascicular pattern changes. (Elias *et al*., 2009; Goedee *et al*., 2013) High resolution USG (HR-USG), on the other hand, provides objective measurements of peripheral nerve thickening and asymmetry and compared with magnetic resonance imaging, HR-USG is more accessible and reasonably precise. (Elias *et al*., 2009; Martinoli *et al*., 2000; Jain *et al*., 2009; PolatEkinci *et al*., 2015) Therefore, in the present study, we used high resolution USG to assess nerve thickness (cross sectional area) in leprosy patients and compared them with those of healthy volunteers. The aim of the study was to assess the usefulness of high resolution sonography in assessing nerve damage in leprosy patients.

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MATERIALS AND METHODS

The study was performed over two and a half years in the department of Dermatology of SKIMS, Medical College, Srinagar and during this period, 20 consecutive leprosy patients

who were in different stages of therapy with WHO multi drug therapy were included in the study. The diagnosis of leprosy was made on clinical signs and symptoms, skin smears, skin biopsy and neuro physiological examination when necessary. The patients were classified according to Ridley and Jopling classification (Ridley and Jopling, 1966) in five groups: Tuberculous (TT), Borderline tuberculous (BT), borderline borderline (BB), Borderline lepromatous (BL) and lepromatous (LL). Patients were also grouped into pauci bacillary (PB) and multi bacillary (MB) according to WHO operational classification. (PolatEkinci *et al*., 2015)

The control group compromised of 20 healthy volunteers and these were randomly chosen after ruling out diabetes, hypothyroidism, HIV infection, alcoholism and any peripheral nerve disease. Written informed consent was obtained from all patients and volunteers. The study was approved by the institutional ethical committee. High resolution ultrasonography (HR-USG) was performed by experienced radiologists with a 12MHz linear transducer (S8, GE). Subjects were examined in a seated position with 45 degree flexed elbows and 90 degree flexed knees. Bilateral ulnar, median and common fibular nerves were scanned along the longitudinal

Table 1. Profile of leprosy patients (LPs)

Leprosy type (n=20)	Age (years)	Sex		Duration of disease (months)	Skin Smear Positive (N)
		Male	Female		
Borderline tuberculoid(n=10)	15-34	8	2	4-60	0
Borderline lepromatous (n=6)	24-30	4	2	7-54	6
Lepromatous leprosy (n=2)	36-59	2	0	3-60	2
Pure neural leprosy(n=2)	19-30	2	0	4-15	0

Table 2. Cross sectional area (CSAs in mm^2) of major peripheral nerves in healthy volunteers and leprosy patients

Nerves	Healthy volunteers		Leprosy patients		p value
	n	Mean (CSA mm^2) +/- SD	n	Mean (CSA mm^2) +/- SD	
Ulnar	40	6.2+/- 1.7	40	9.6 +/- 6.2	< 0.0001
Median	40	6.4+/- 1.5	37	8.9 +/- 5.4	< 0.0001
Common fibular	40	7.2+/- 3.4	38	10.1+/- 6.5	< 0.0001

n = number of nerves examined

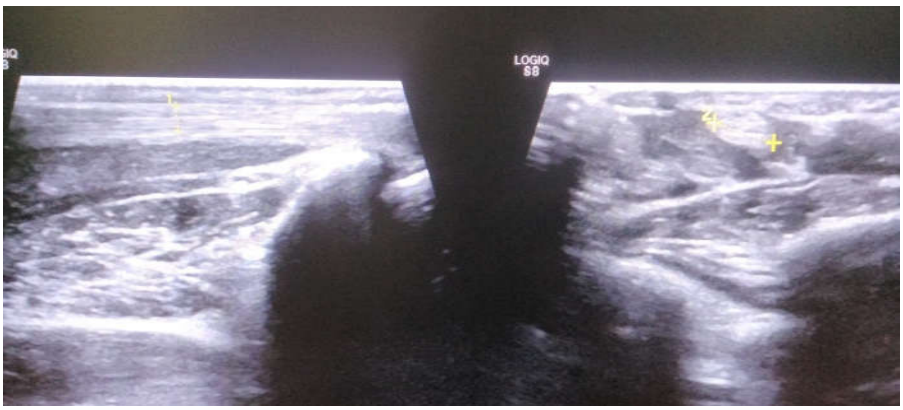

Figure 1. Transverse and longitudinal ultrasonogram of median nerve from a healthy subject showing 'honeycomb pattern' in transverse scan and 'bundle of straw pattern' in longitudinal scan

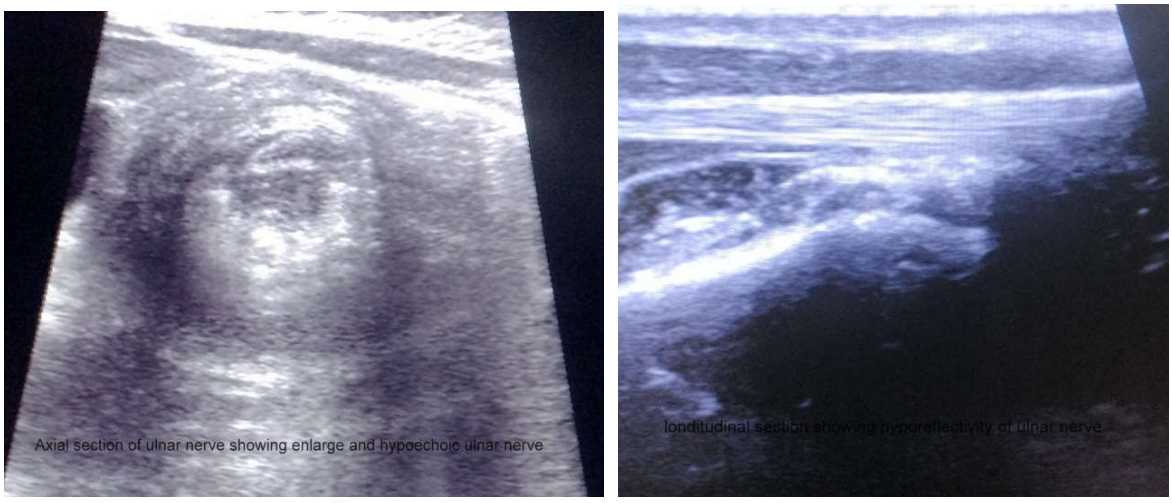

Figure 2. Transverse and longitudinal ultrasonogram of ulnar nerve from a leprosy patient showing slight hyporeflectivity and increased cross sectional area (CSA)

and transverse axes. The ulnar nerves were scanned from middle of arm to forearm and the cross sectional area of ulnar nerve was measured above the medial epicondyle between the triceps brachii and the biceps brachiimuscles. The median nerves were scanned in the forearm and wrist and cross sectional areas were measured approximately 3cms from flexerretinaculum. The common fibular nerves were evaluated from distal third of thigh to the knee at the fibular head and the cross sectional areas were measured at the level of fibular head. The cross sectional areas were measured by the free hand delimitation at the echogenic borders of nerves using electronic cursor. The echo reflectivity of the nerves was also assessed and was arbitrarily graded as mildly hypoechoic, moderately hypoechoic, and hypoechoic with loss of fascicular pattern. Statistical analysis was performed using SPSS software version 11. For comparison of group differences, the Wilcoxon- Mann-Whitney testwere used. Probability (p) values less than 0.05 were considered significant.

RESULTS

All 40 subjects underwent sonographic examination. Out of 20 leprosy patients, 16 were male and 4 were female; mean age was 40.1 years (range 15-59 years). Out of the 20 healthy volunteers, 12 were male and 8 were female; mean age was 33.1 years (range 18-48 years). A total of235 nerves were examined. Two median nerves and three common fibular nerves could not be examined in the subject group due to technical problems. Table 1 shows the profile of leprosy patients. The means and standard deviations of cross sectional areas in leprosy patients and healthy volunteers as well as the respective p values are given in Table 2. The means of the ulnar, median and common fibular nerves in healthy volunteers were lower than those in the leprosy patients ($p< 0.0001$).

DISCUSSION

Leprosy neuropathy which is responsible for most of the feared consequences of the disease, is difficult to diagnose early in the course of disease. Clinical findings, electro physiological tests and nerve imaging using ultrasound and MRI have been used previously to diagnose nerve involvement in leprosy patients. (Jain *et al*., 2009; Klauser *et al*., 2009; Klauser *et al*., 2011; Grimaud *et al*., 2000) High resolution sonography is non invasive, useful for studying structural changes in nerve sites that cannot be biopsied and is more cost effective than MRI. Also ultrasound can examine multiple nerves over a long course within a few minutes. Besides enlargement, nerves in leprosy patients show varying degree of structural abnormalities such as fusiform enlargement, reduced echogenecity and loss of fascicles. Elias Jr *et al.* (2009) in a study showed ulnar nerve thickening on high resolution ultrasonography without any electro physiological abnormalities, thus indicating that an effected nerve may function normally. This study shows that high resolution ultrasonography plays an important role in detecting neuropathy early in the course of disease. Jain *et al.* (2009) using high resolution ultrasonography, showed that the kappa value between clinical palpation and assessment of nerve size and by ultrasonography is low. They concluded that clinical examination of enlarged nerves is subjective and inaccurate. As expected, the present study showed higher mean cross sectional area values in leprosy patients compared to healthy volunteers. These results reveal that the use of high resolution sonography to calculate cross sectional areas of peripheral nerves is an important and non invasive tool to detect nerve damage in leprosy patients. One limitation of our study is the lack of electro physiological correlation. However, our main aim was the evaluation of nerve thickening. Therefore, although we did not perform electro physiological tests, we consider that our results demonstrate the usefulness of high resolution ultrasonography of nerves in early diagnosis of leprosy neuropathy.

REFERENCES

Elias Jr J, Nogueira-Barbosa MH, Feltrin LT, Furini RB, Foss NT, Marques Jr W, dos Santos AC. 2009. Role of ulnar nerve sonographyin leprosy neuropathy with electrophysiologic correlation. *J Ultrasound Med*., 28: 1201-1209.

Goedee HS, Brekelmans GJF, van Asseldonk JTH, Beekman R, Mess WH, Visser LH. 2013. High resolutionsonography in the evaluation of the peripheral nervous system in polyneuropathy—a review of the literature. *Eur J Neurol*., Oct; 20:1342–51

Grimaud J, Verchot B, Blum L, Chapuis F, Millan J 2000. Clinical screening for ulnar nerve damage in leprosy patients. *J Neurol*., 247: 966-967.

Jain S, Visser LH, Praveen TLN, Rao PN, Surekha T, Ellanti R, *et al*. 2009. High-resolution sonography: a new technique to detect nerve damage in leprosy. *PLoSNegl Trop Dis*., Jan; 3(8):e498

Klauser AS, Halpern EJ, de Zordo T, Feuchtner GM, Arora R, Gruber J, Martinoli C, Löscher WN. 2009. Carpal tunnel syndrome assessment with US: value of additional cross-sectional area measurements of the median nerve in patients versus healthy volunteers. *Radiology*, 250: 171-177.

Klauser AS, Halpern EJ, Faschingbauer R, Guerra F, Martinoli C, GablMF, Arora R, Bauer T, SojerM, Löscher WN, Jaschke WR. 2011. Bifid median nerve in carpal tunnel syndrome: assessment with US cross-sectional area measurement. *Radiology*, 259: 808-815.

Martinoli C, Derchi LE, Bertolotto M, Gandolfo N, Bianchi S, Fiallo P, *et al*. 2000. US and MR imaging of peripheral nerves in leprosy. *Skeletal Radiol*., Mar; 29(3):142–50.

PolatEkinci A, Karabacak E, Tekin L, Özarmağan G, Özçakar L. 2015. Ultrasound imaging for the follow-up of patients with leprosy: a pictorial essay. *BrJDermatol*., 172(1):265–7

Ridley DS. and Jopling WH 1966. Classification of leprosy according to immunity. A five-group system. *Int J Lepr Other Mycobact Dis.,* 34: 255-273.

WHO - World Health Organization 2011. Relevé épidémiologiquehebdomadaire. *Wkly Epidemiol Rec*., 86: 389-400.

Wilder- Smith EP. and VanBrakel WH. 2008. Nerve damage in leprosy and its management. *Nat Clin Pract Neurol*., 4: 656-663.

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