

Corneal Confocal Microscopy Detects Small-Fibre Neuropathy In Burning Mouth Syndrome



Introduction

Primary burning mouth syndrome (BMS) is a painful burning sensation affecting the oral mucosa. Evidence indicates that BMS patients may suffer from small fibre neuropathy. Hitherto, tongue/mucosal biopsy has been the only method to detect objective small nerve fibre changes. However, the new technique of corneal confocal microscopy (CCM) has detected and quantified these changes non-invasively in other conditions.

Aims

The aim of this study was to investigate if corneal confocal microscopy can detect the presence of small fibre neuropathy in burning mouth syndrome patients versus healthy controls.

Methods

This was a cross-sectional observational study. Participants were screened for secondary causes of BMS and other neuropathic conditions prior to inclusion. The primary outcome markers were morphometric measures obtained from CCM of the corneal sub-basal nerve plexus. One-way analysis of variance (ANOVA) was used to test the differences between means.

Results

17 BMS patients were recruited from two UK Dental Hospitals and compared with 14 healthy age matched control subjects. Average age in years 61.7 ± 6.5 for BMS subjects versus for Controls 59.3 ± 8.68 . Both corneal nerve fibre density and corneal nerve fibre length were significantly lower in the BMS subjects than controls 29.27 ± 6.22 versus 36.19 ± 5.9 and 21.06 ± 4.77 versus 25.39 ± 3.91 ($p=0.007$) respectively. Corneal nerve fibre tortuosity and branch density were not significantly different.

Table 1. Corneal Confocal Microscopy measurements in BMS patients and controls

	BMS (n=17)	Controls (n=14)	95% CI	P value
Age (years)	61.76±6.5	59.3±8.68	[-8.46, 3.55]	0.4
CNFD (no./mm ²)	29.27±6.22	36.19±5.9	[2.20, 11.63]	0.007
CNBD (no./mm ²)	74.83±27.43	76.48±23.15	[-18.29, 21.57]	0.7
CNFL (mm/mm ²)	21.06±4.77	25.39±3.91	[0.90, 7.76]	0.007
CNFT (TC)	14.42±2.95	16.41±2.79	[-0.24, 4.22]	0.06
LC's density (no./mm ²)	74.04±83.37	29.17±45.14	[-99.29, 9.54]	0.02

Abbreviations: CNFD = corneal nerve fibre density, CNBD = corneal nerve fibre branch density, CNFL = corneal nerve fibre length, CNFT = corneal nerve fibre tortuosity, LC's = Langerhan cells, 95% CI= confidence interval of difference All data presented as Mean±SD.

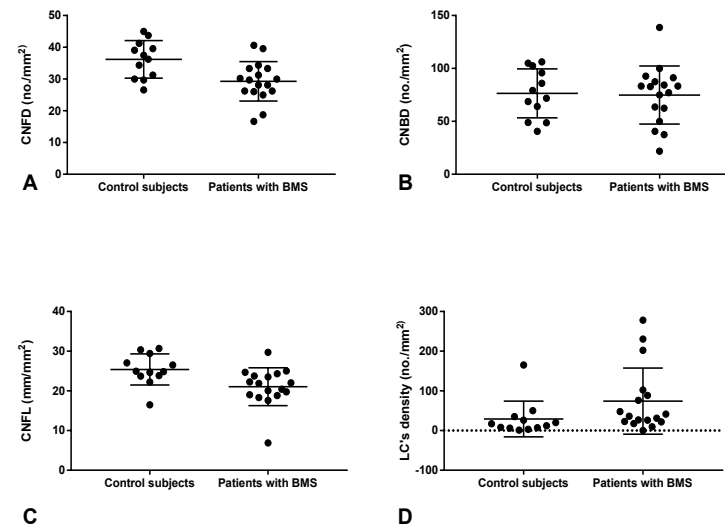


Figure 2. Corneal nerve fibre density (CNFD) (A), Corneal nerve branch density (CNBD) (B), Corneal nerve fibre length (CNFL) (C) and Langerhan's cell (LC's) density (D) in control subjects and patients with BMS. Bars indicate mean and one standard deviation.

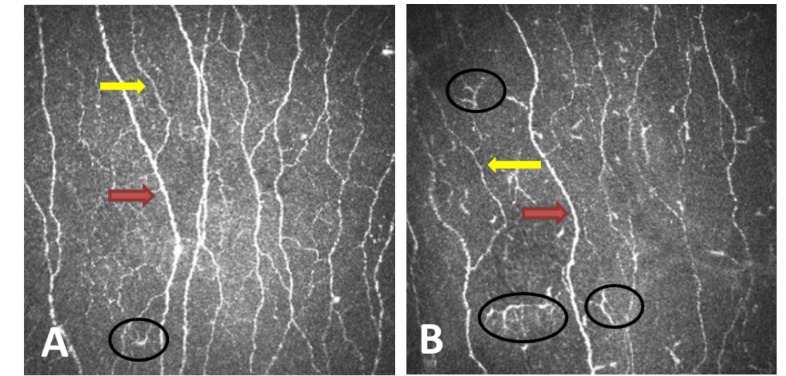


Figure 1. CCM images of the central sub-basal nerve plexus from a healthy control subject (A) and patient with BMS (B). Red arrows indicate main nerves, yellow arrows indicate branches and circles indicate Langerhans cells.

Conclusion

These findings suggest further evidence for the presence of small fibre neuropathy in BMS. Additionally, the technique of corneal confocal microscopy has been shown in other conditions to predict severity of disease and demonstrate improvement in small fibre neuropathy following treatment. Further study of this non-invasive technique in BMS may be useful to stratify subjects in terms of severity, subtype or treatment response.

References

- Lauria G, Majorana A, Borgna M, et al. Pain 2005;115:332-337
- Puhakka A, Forsell H, Soimila S, et al. Oral Disease 2016;22:338-344.
- Tavakoli M, Marshall A, Banka S, et al. Muscle Nerve 2012;46:698-704.
- Tavakoli M, Marshall A, Pitceathly R, et al. Experimental Neurology 2010;223:245-250
- Tavakoli M, Quattrini C, Abbott C, et al. Diabetes Care 2010;33:1792-1797.
- Yilmaz Z, Renton T, Yiangou Y, et al. Journal of Clinical Neuroscience 2007;14:864-871