

# Evidence to support the hypothesis of tuberculosis as a cause of extreme osteonecrosis and osteomyelitis of the mandible in a West African population



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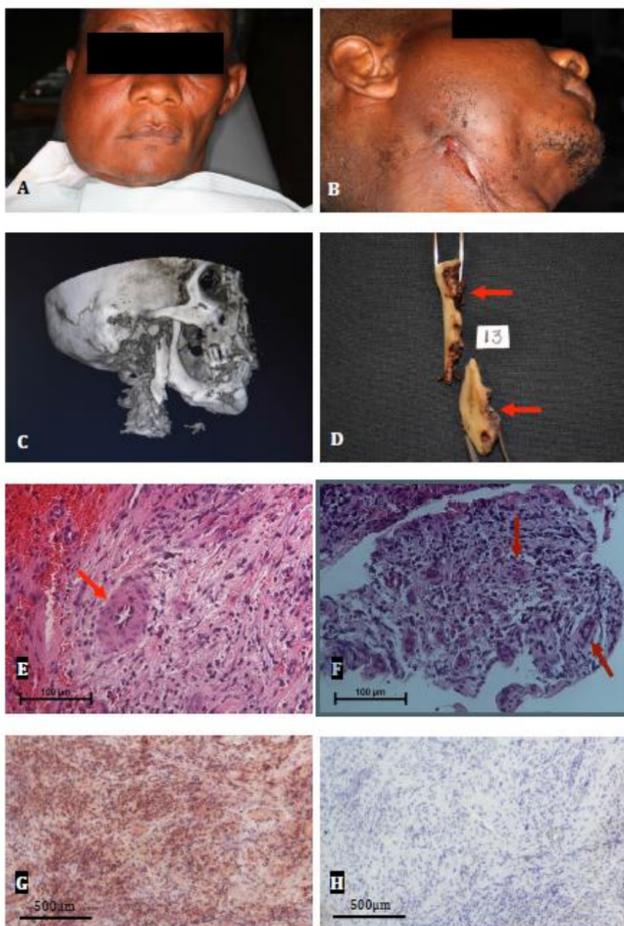
## BACKGROUND

We have previously reported 60 cases of extreme osteonecrosis and osteomyelitis of the maxillofacial skeleton (1). Maxillofacial tuberculosis is rare. Nineteen cases collected over a three month period in West Africa, showing extreme bony destruction in the mandible are presented. A potential link between tuberculosis and destruction of the jaw bones is suggested by three recent case reports describing a tuberculous lesion in the condylar head of the mandible (2,3,4) Hebling CA 2010, Patel M et al, 2012, Ranganathan LK et al 2012).

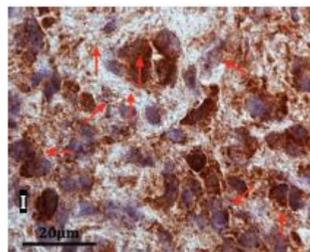
## PATIENTS AND METHODS

Samples from 19 patients, Sierra Leone (n=17) and Liberia (n=2), collected over a three month period from outpatients who voluntarily attended the dental clinic. High resolution 3D micro CT scanning (Xradia MicroXCT-200) was used to evaluate bony destruction in the condylar head.

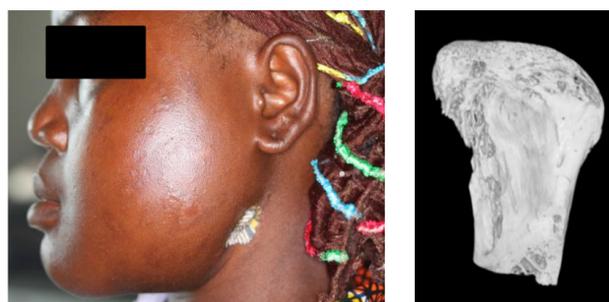
Paraffin embedded sections were stained with H&E and immunohistochemistry. Samples were stained with antibodies against EMR-1 (Thermo Fisher Scientific PA5-33502), a marker for mature macrophages. Immunohistochemical staining with antibodies against purified proteins derived from *M.tuberculosis* (GenWayBio GWB.EF714E) were used to demonstrate mycobacterial proteins in and around macrophages.



Adult male with unilateral facial swelling(A), and a fistula at the mandibular angle(B). Lesions developed after he removed an infected tooth himself. Formalin-preserved fragment showing medial destruction of the condylar head and ascending ramus(C). CBCT showing destruction of the condylar head and ascending ramus(D). H&E stained section showing a thick walled blood vessel (arrow) and extravasation of red blood cells into the surrounding tissues(E). (Scale bar 500µm). H&E stained section showing inflammatory tissue with macrophages, multiple thick wall vessels, and red blood cells(F) (Scale bar 500µm).



Tissue section showing large numbers of EMR-1 antibody-positive macrophages(G), compared with negative control antibody(H). Tissue section stained with antibody against mycobacterial proteins showing large numbers of round or elongated structures (arrows) within and around macrophages(I) (Scale bar 20µm).



Adult female with left facial swelling and draining fistula at mandibular angle (A). Micro CT showing pitted surface destruction of condylar medial and articular surfaces (B).

## CONCLUSION

Many of the patients in the current study show an almost identical clinical presentation to the case reports documenting TB lesions of the condylar head (2,3,4). We demonstrated antigenic material derived from *M.tuberculosis* in macrophages and soft tissue. These activated EMR-1-positive macrophages, in conjunction with osteoclasts, may be responsible for the pattern of bony destruction observed by micro CT imaging of the condylar head. Several factors suggest that there may be an association between tuberculosis infection and the pattern of maxillofacial destruction seen in many of the patients in this presented study. Studies are underway to DNA sequence the mycobacterial material collected. A further clinical documentation, TB testing and sample collection trial is planned to start in late 2016.

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