Enthesopathic patterns of two South African female cadavers

N. Naidoo1, L. Lazarus2, K.S. Satyapal2

1College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai Healthcare City, Dubai, United Arab Emirates
2Department of Clinical Anatomy, School of Laboratory Medicine and Medical Sciences, College of Health Sciences, University of KwaZulu-Natal, Westville Campus, Durban, South Africa

[Received: 7 August 2014; Accepted: 28 September 2014]

Enthesopathy is considered to be an osseous phenomenon, either disease-specific or bone-site specific, which occurs at the enthesis of bone. Upon routine cadaveric dissection of the glenohumeral region in two Caucasian females, enthesopathy of the right proximal humerus was observed unilaterally in both cases. Case 1 exhibited an inconsistent pattern of bony protuberances and crests dispersed across the lesser and greater tuberosities of the right humeral head. Varying degrees of ossification of the distal subscapularis muscle was also observed. Case 2 presented with a distinctively large enthesophyte that protruded supero-medially from the proximal right humerus. In addition, ossification of the distal-most aspect of the supraspinatus muscle was identified. Cases 1 and 2 were both reflective of osteophytic enthesopathy as proliferative change was clearly visible on the proximal aspect of each humerus.

Whilst the presence of enthesopathies may be indicative of underlying pathology, it may prove beneficial to the field of bioarchaeology for the remodelling of lifestyles of ancient civilizations through the provision of current day variations as seen in these two case studies. (Folia Morphol 2017; 76, 2: 326–330)

Key words: enthuses, enthesopathy, proximal humerus, osteophytic

INTRODUCTION

The osseous insertion site of a tendon, muscle, ligament, fascia and/or articular capsule is referred to as an enthesis [14, 17, 22]. Since the enthesis is a hybrid tissue composed of cartilage and collagen fibres, it may be classified as fibrous or fibrocartilaginous depending on the nature of the tissue at that particular skeletal insertion site [2–4, 10, 12, 23]. Enthesopathy is regarded as one of the three main types of pathological degeneration occurring at articular regions [8, 9, 17]. Although enthesopathies are considered to be important musculoskeletal markers of human skeletal remains in the field of paleontology, the clinical focus is attributed to the underlying traumatic, metabolic, inflammatory, degenerative and endocrine diseases [1, 9, 11, 17, 21, 22]. Mariotti et al. [14] described enthesopathies as osteophytic, displaying proliferative change, and osteolytic, that of which is characterised by erosion. Enthesopathies thus differ morphologically from minute crests and elevations to prominently large bony spurs [22].

Due to the peripheral and spinal nature of entheses, enthesopathies have been reported to affect skeletal sites of the pelvis, humeral head, femoral trochanter, patella, vertebral column, olecranon of the ulnar and the calcaneus [17, 22]. Many studies have documented the presence of enthesopathies...
upon radiological examination and in human cadav-
eric and dry skeletal specimens [11]. Bioarchae-
gists are intrigued by the multitude of factors and
processes that are responsible for the development
of enthesopathies.

CASE REPORTS
During routine cadaveric dissection at the De-
partment of Clinical Anatomy at the University of
KwaZulu-Natal, two cases of osteophytic enthesopa-
thy were identified.

Case 1
An 85-year-old Caucasian female presented with
varying degrees of circumscribed protuberances and
crests spanning the area of the lesser and greater
tuberosities of the right humeral head (Fig. 1). The
subscapularis muscle was ossified most distally at the
tendinous insertion to the lesser humeral tuberosity.
Furthermore, the muscular belly and tendinous parts
of the supraspinatus muscle were absent (Fig. 2).

Case 2
A relatively large bony spur/enthesophyte was
reported in a 91-year-old Caucasian female. It ap-
peared to protrude supero-medially from the proximal
aspect of the right humerus, situated merely inferior
to the surgical humeral neck (Fig. 3). Subsequently,
the distal half of the supraspinatus muscle was com-
pletely ossified.

DISCUSSION
The “activity-specific” nature of the upper limb
osteology is the focal point in bioarchaeology for
the geo-social exploration of ancient human civili-
zations [11, 14, 21]. Recent studies have redefined
the enthesis as an organ comprising of intercon-
nected anatomical tissue performing the common
function of stress dissipation [15, 20]. This “en-
thesis organ” concept suggests that the pressure
exerted at the enthesis will disseminate to adjacent
structures [5].

This report describes two cases of enthesopathy
observed in two females over the age of 80. Since
there was no known record of any pathology pre-
mortem, it was understood that both individuals died
as a result of natural causes. Despite the difference
in morphology, both enthesopathies were described
as osteophytic due to the proliferative nature. In ac-
cordance with the classification scheme proposed
by Benjamin et al. [2], both entheses observed in
this study were fibrocartilaginous and subject to
mechanically-related enthesopathies.

According to Shaibani et al. [19], Mariotti et al.
[14] and Voudouris et al. [22], enthesopathy is consid-
ered to be a phenomenon of advancing age. Mariotti
et al. [14] and Villotte et al. [21] stated that osteo-
phytic enthesopathies are generally more pronounced
in elderly individuals, a finding which reflected unilat-
erally in both cases of this report. As a result, Villotte
et al. [21] reported that the incidence of enthesopa-
thies were higher on the right side than on the left
side. Although the frequency of enthesopathies is
deemed to be greater in males, this report was no-
tably focused on females [14]. During medieval times
the presence of such sex differences was attributed
to the conventional “man the hunter vs. woman the
gatherer” labour division [14].
Contrary to the correlative relationship between osteolytic changes and tendon tears established by Bianchi et al. [7], Cormick [8] described the development of tendon tears to be caused by enthesopathy and subsequent loss of tendon pliability. Despite the well-defined functional-anatomic unit formed...
by the rotator cuff, the glenohumeral joint is subject to a great degree of pathology [16, 18]. A magnetic resonance imaging study conducted by Lambert et al. [13] confirmed that rotator cuff tears originate from the insertion site of the supraspinatus tendon. Subsequently, Henderson [11] reported the frequency of enthesopathy at the enthesis of the supraspinatus tendon to be 83%. This relatively high incidence may account for the defined protuberances and crests dispersed throughout the greater humeral tuberosity, specifically at the supraspinatus insertion site, observed in Case 1. Mariotti et al. [14] observed a similar skeletal pattern at the entheses of the ulnar collateral ligament and common flexor attachment on the medial humeral epicondyle. Case 2 was considered to be characteristic of a typical enthesopathy due to the location of the supero-medial entheseophyte at the periphery of the proximal humerus [21]. Histological studies suggest that an entheseophyte is in fact the combined result of a densely calcified area of fibrocartilage and the fusion of a number of bony nodules [6]. In view of Wolff’s law, which states that bone will adapt and remodel when subjected to load and/or stress, it is understood that the entheseophyte region of a cancellous long bone remarkably develops into cortical bone [6].

In the present report, the distinct osteophytic differences in the morphology of the proximal humerus may be related to the repetitive stress forces exerted across the enthesis during initiation of movement [11, 12, 14]. Osteophytic changes of glenohumeral skeletal remains may thus provide a palaeopathological diagnosis characteristic of rotator cuff disease [2, 18].

Many studies have discussed the occurrence of enthesopathy as a “disease-specific lesion” [11, 14, 22]. Disease processes of the seronegative spondyloarthropathy class, i.e. a range of arthropathies, reflect skeletal manifestations typical of enthesopathy and are especially significant in modern-day populations due to the socio-economic transformation [10, 11, 22]. Subsequently, Benjamin and McGonagle [5] emphasized the role and identification of abnormal osteological features at fibrocartilaginous entheses; the nature of which was seen in both cases of this report; as these are generally associated with diseases of the seronegative spondyloarthropathy class. Osteophytic and osteolytic enthesopathies of the humeral tuberosities may be characteristic of acromegaly and hyperparathyroidism, respectively [11]. The protrusion of the bony spur observed in Case 2 may be considered an inflammatory response to healing caused by bony and cartilaginous ossification at the site in question [22].

CONCLUSIONS

Despite the “spontaneous” occurrence of such unique skeletal manifestations, it is evident that enthesopathies are reflective of underlying pathology. The enthesis clearly provides for more than mere insertion to a structure, it may be an indicator of a spectrum of abnormally functioning factors and processes that are either disease-specific or bone-site specific. The reporting of these phenomena in clinical literature may assist the clinician and radiologist with a definite diagnosis and treatment. This invaluable contribution to the field of bioarchaeology may facilitate the skilful remodel of the lifestyle of ancient populations. Furthermore, the recognition and knowledge of glenohumeral enthesopathies may prevent a cascade of degenerative changes which follow rotator cuff pathology.

REFERENCES