Relation between Heberden’s nodes and distal interphalangeal joint osteophytes and their role as markers of generalised disease

Flavia M Cicuttini, Juliet Baker, Deborah J Hart, Tim D Spector

Abstract

Objective—Heberden’s nodes are often used as a marker for osteoarthritis (OA). This study examined how often Heberden’s nodes and radiological distal interphalangeal (DIP) osteophytes coexist in the same digit and the sensitivity, specificity, and positive predicative value of each for OA at different sites or generalised disease.

Methods—This was a population-based study of 660 middle aged women taking part in a twin study of OA. Distal interphalangeal osteophytes were defined radiologically and graded on a four point scale (0–3) using a published atlas of individual features. Heberden’s nodes were defined by standardised clinical examination. OA in other joints (knees, proximal interphalangeal (PIP) joints and carpometacarpal (CMC) joints) was defined radiologically using a published atlas.

Results—Poor agreement was observed between a Heberden’s node (HN) and a radiological distal interphalangeal osteophyte in the same finger of the same hand (k statistic (95% CI) = 0.36 (0.33, 0.39)). Although HN and radiological DIP osteophytes had similar sensitivity, the specificity and positive predicative value of DIP osteophytes was considerably higher for detecting knee, CMC, PIP OA, and OA in more than two groups of joints (knee, CMC, and DIP joints).

Conclusion—HN are not synonymous with DIP osteophytes. Radiological DIP osteophytes are a better marker of knee and multiple joint OA than HN. HN may still be an imperfect surrogate for hand OA when radiology is impractical, but are not an accurate marker of generalised disease.

osteophytes (based on radiological grade) and clinical Heberden’s nodes (based on clinical grade). The sensitivity, specificity, and positive predictive value of Heberden’s nodes and distal interphalangeal osteophytes for different forms of osteoarthritis were obtained for the sensitivities, specificities, and positive predictive values by considering them as proportions and applying a normal approximation to the binomial distribution and including a continuity correction.13

Results
Only modest agreement was observed between HN and radiological DIP osteophytes in the same finger of the same hand ($\kappa$ (95% CI) = 0.36 (0.33, 0.39) (table 1). It was found that 16.2% of DIP joints had DIP osteophytes and 13.2% clinical HN, and only 6.6% both. If the $\kappa$ statistic of agreement was recalculated based on a more stringent classification of disease so that grade 1 DIP osteophytes were reclassified as no disease and grade 1 HN were reclassified as no disease, there was still poor agreement ($\kappa$ = 0.27 (0.24, 0.30)).

The sensitivity (95% CI) and specificity (95% CI) of HN for DIP osteophytes at any digit was 0.41 (0.38, 0.44) and 0.92 (0.91, 0.93) respectively. When a more stringent grading of DIP osteophytes (presence classified as grade $\geq 2$), the sensitivity improved 0.72 (0.66, 0.77) with little change in specificity 0.89 (0.88, 0.90). The positive predictive value of HN for DIP osteophytes was 0.50 (0.46, 0.53), increasing to 0.80 (0.78, 0.82) when DIP osteophytes were classified as present using the more stringent grading ($\geq 2$).

Radiological DIP osteophytes had generally better specificity and positive predictive value for detecting knee, CMC, PIP OA, and OA in more than two groups of joints (knee, CMC, and DIP joints) than HN (table 2). The sensitivity of radiological DIP osteophytes and HN for each of the above types of OA was similar.

Discussion
This study has shown modest agreement between clinical HN and radiological DIP osteophytes in the same finger. Radiological DIP osteophytes had higher specificity and positive predictive value for detecting knee, CMC, PIP OA, and OA in more than two groups of joints (knee, CMC, and DIP joints) than HN.

“Sensitivity” is the proportion of true positives correctly identified. In this study, the sensitivities for knee OA or multiple joint OA were similar using HN or DIP osteophytes as markers. “Specificity” is the proportion of negatives correctly identified. Our study showed a negative DIP osteophyte result correctly excluded knee OA 69% of the time and multiple joint OA 81% of the time.

Table 1 Agreement between Heberden’s node and radiological distal interphalangeal osteophytes in the same finger in 6590 digits

<table>
<thead>
<tr>
<th>Heberden’s nodes</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiological DIP osteophytes</td>
<td>Yes</td>
<td>433</td>
<td>438</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>631</td>
<td>5088</td>
</tr>
<tr>
<td>Total</td>
<td>1064 (16.1%)</td>
<td>5526 (83.9%)</td>
<td>6590</td>
</tr>
</tbody>
</table>

$\kappa$ statistic of agreement between Heberden’s nodes (based on clinical grade $\geq 1$) and radiological osteophytes (based on radiological grade $\geq 1$) (95% CI) = 0.36 (0.33, 0.39).

Table 2 The sensitivity, specificity, and positive predictive value of Heberden’s nodes and distal interphalangeal osteophytes for different forms of osteoarthritis

<table>
<thead>
<tr>
<th>Form of osteoarthritis</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF OA</td>
<td>0.63 (0.51, 0.75)</td>
<td>0.48 (0.41, 0.55)</td>
<td>0.26 (0.19, 0.32)</td>
</tr>
<tr>
<td>PF OA</td>
<td>0.56 (0.45, 0.66)</td>
<td>0.45 (0.38, 0.51)</td>
<td>0.28 (0.21, 0.35)</td>
</tr>
<tr>
<td>Knee OA</td>
<td>0.58 (0.47, 0.67)</td>
<td>0.47 (0.40, 0.54)</td>
<td>0.37 (0.29, 0.44)</td>
</tr>
<tr>
<td>CMC</td>
<td>0.69 (0.60, 0.78)</td>
<td>0.58 (0.50, 0.65)</td>
<td>0.52 (0.43, 0.60)</td>
</tr>
<tr>
<td>PIP OA</td>
<td>0.52 (0.43, 0.60)</td>
<td>0.57 (0.50, 0.63)</td>
<td>0.36 (0.28, 0.44)</td>
</tr>
<tr>
<td>OA in $\geq 2$ joint groups</td>
<td>0.68 (0.58, 0.77)</td>
<td>0.52 (0.45, 0.59)</td>
<td>0.41 (0.33, 0.49)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distal interphalangeal osteophytes*</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF OA</td>
<td>0.63 (0.51, 0.74)</td>
<td>0.74 (0.68, 0.79)</td>
<td>0.38 (0.29, 0.47)</td>
</tr>
<tr>
<td>PF OA</td>
<td>0.47 (0.36, 0.56)</td>
<td>0.71 (0.65, 0.76)</td>
<td>0.37 (0.28, 0.46)</td>
</tr>
<tr>
<td>Knee OA</td>
<td>0.52 (0.42, 0.61)</td>
<td>0.75 (0.69, 0.80)</td>
<td>0.51 (0.41, 0.60)</td>
</tr>
<tr>
<td>CMC</td>
<td>0.60 (0.50, 0.68)</td>
<td>0.76 (0.69, 0.82)</td>
<td>0.63 (0.53, 0.72)</td>
</tr>
<tr>
<td>PIP OA</td>
<td>0.90 (0.82, 0.97)</td>
<td>0.77 (0.70, 0.82)</td>
<td>0.53 (0.43, 0.63)</td>
</tr>
<tr>
<td>OA in $\geq 2$ joint groups</td>
<td>0.68 (0.59, 0.77)</td>
<td>0.81 (0.76, 0.86)</td>
<td>0.61 (0.51, 0.69)</td>
</tr>
</tbody>
</table>

*Point estimate (95% CI).
contrast, for absence of HN, the corresponding results were only 47% and 52% correct. The positive predictive value (PPV) is the probability of an individual having multiple joint OA given that the individual has either DIP osteophytes or HN. The PPV for multiple joint involvement was higher for individuals with DIP osteophytes (61%) than for HN (41%). This difference could not be explained by the small difference in prevalence (16.1% versus 13.2%). Overall, these results suggest that DIP osteophytes are a better marker of knee OA and multiple joint OA that HN.

A previous population-based study using different subjects showed, as with this study, that hand radiology was a better predictor of knee disease than clinical hand examination. This is consistent with previous studies that showed that HN are not necessarily associated with OA in other joints. It is possible that different radiographic views might have revealed more radiological signs of OA, but lateral views are difficult to obtain and have largely been abandoned. In our view, it is unlikely to have caused a serious underestimate of osteophytes. Furthermore, using a more stringent radiological grading (radiological DIP OA present if grade ≥2) did not improve the agreement between HN and radiological osteophytes (κ = 0.27 (0.24, 0.30)).

There is a lack of a clear definition of HN in the literature. In standard rheumatology text books, the terms DIP OA and HN are often used interchangeably. However, the histology of HN remains unclear and a variety of pathologies have been described, including the presence of bony outgrowths that are consistent with osteophytosis, cartilage hypertrophy or even mucoid transformation of the periaricular fibroadipose tissue associated with proliferation of myxoid fibroblasts and cyst formation.

In conclusion, our results show that DIP osteophytes and HN are only weakly correlated in the same digit and that as a marker of susceptibility to generalised disease, the presence of DIP osteophytes is a more reliable tool. The poor performance of HN as a marker of OA elsewhere and our ignorance of the underlying pathology suggests that its role in clinical research and practice needs to be re-evaluated.

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