Does This Patient Have Clubbing?

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CLINICAL SCENARIOS

Case 1
A respiratory therapist asks you to see her asymptomatic 76-year-old mother in consultation because she is concerned that her mother has clubbing. The patient has increased curvature of the nails, and you wonder whether other physical examination techniques can help you decide whether clubbing is present.

Why Is the Clinical Examination Important?

Clubbing is one of those phenomena with which we are all so familiar that we appear to know more about it than we really do.1

Samuel West, 1897

The association of clubbing with a host of infectious, neoplastic, inflammatory, and vascular diseases has captured the imagination of clinicians since Hippocrates first described clubbing in a patient with empyema in the fifth century BC.2 Although clubbing can be a benign hereditary condition, the diagnostic implications in an adult are such that its detection should prompt consideration of the underlying etiology (TABLE 1).3,4 In the pediatric population, clubbing usually represents the progression of established diseases, such as cystic fibrosis or uncorrected cyanotic congenital heart disease.

Digital clubbing is characterized by the enlargement of the terminal segments of the fingers and/or toes that results from the proliferation of the connective tissue between the nail matrix and the distal phalanx. Although most often symmetrical, clubbing can be unilateral or even unidigital.3,6 Clubbing can occur in isolation or in association with hypertrophic osteoarthropathy.7,8 Hypertrophic osteoarthropathy, a systemic disorder affecting bone and joints, is most commonly associated with bronchogenic carcinoma, but...
Table 1. Conditions Associated With Acquired Clubbing

<table>
<thead>
<tr>
<th>Condition</th>
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<tbody>
<tr>
<td>Neoplastic intrathoracic disease</td>
</tr>
<tr>
<td>Bronchogenic carcinoma</td>
</tr>
<tr>
<td>Malignant mesothelioma</td>
</tr>
<tr>
<td>Pleural fibroma</td>
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<tr>
<td>Metastatic osteogenic sarcoma</td>
</tr>
<tr>
<td>Suppurative intrathoracic disease</td>
</tr>
<tr>
<td>Lung abscess</td>
</tr>
<tr>
<td>Bronchiectasis</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
</tr>
<tr>
<td>Empyema</td>
</tr>
<tr>
<td>Chronic cavitary mycobacterial or fungal infection</td>
</tr>
</tbody>
</table>

Diffuse pulmonary disease
- Idiopathic pulmonary fibrosis
- Asbestosis
- Pulmonary arteriovenous malformations
- Cardiovascular disease
- Cyanotic congenital heart disease
- Infective endocarditis
- Arterial graft sepsis
- Brachial arteriovenous fistula
- Hemiplegic stroke
- Gastrointestinal disease
- Inflammatory bowel disease
- Celiac disease
- Hepatobiliary disease
- Cirrhosis (particularly biliary and juvenile)
- Metabolic disease
- Thyroid acropathy

*Associated with clubbing distal to graft sepsis.
†Associated with unilateral clubbing.

Pathophysiology

Normally, the nail-bed thickness is less than 2.0 mm. Clubbed fingers studied at autopsy show not only a thickness greater than 2.0 mm, but also a lower density of nail-bed connective tissue. Morphologic findings include the presence of primitive fibroblasts, elevated numbers of eosinophils and lymphocytes, and increased caliber and number of blood vessels. Genetic predisposition, vagally mediated neural mechanisms, and the direct effect of tissue hypoxia or of circulating vasoactivators that elude metabolism in the lung through right-to-left shunting have all been proposed to explain the morphologic changes. Although there is experimental and clinical evidence to support each of these hypotheses, it has not been possible to formulate a comprehensive theory of pathogenesis applicable to all clinical circumstances.

Symptoms

Clubbing is almost always painless, unless it is associated with hypertrophic osteoarthropathy. Symptoms of hypertrophic osteoarthropathy include periarticular pain and swelling, most often in the wrists, ankles, knees, and elbows. Accordingly, the presentation of hypertrophic osteoarthropathy can be confused with such primary rheumatologic disorders as rheumatoid arthritis. Many patients with clubbing express unawareness of any abnormality in their fingers. In one series of patients with clubbing, only 32 of 116 patients were aware of the onset of the changes in their nails, and only 2 reported painful fingers or joints.

Signs

Identification of advanced clubbing, which is characterized by so-called drumstick fingers poses little difficulty for clinicians. By contrast, the subtleties of the earlier stages of clubbing may lead to animated bedside debate among medical students, residents, and experienced physicians. The 2 approaches for identifying clubbing on physical examination are visual inspection and palpation of the cuticle for increased sponginess.

Inspection

General Appearance. Inspection of the fingers for clubbing can reveal abnormalities in the nail-fold angles, and in the shape, depth, and width of the terminal phalanges. In addition to the obvious changes in the shape of the terminal phalanges in established clubbing (Figure A), close inspection of the cuticle may reveal a shiny and smooth appearance. Lovibond described a lilac hue of the nail fold in clubbing, caused by increased vascularity in the connective tissue. Although the increased nail curvature seen in clubbed fingers has been studied extensively using chord-arc measurements and unguisometers, it is not easily measured at the bedside. Moreover, nail curvature tends to become more pronounced with age and can occur in the absence of other signs of clubbing.

Nail-fold Angles. Inspection of clubbed fingers reveals a number of abnormalities in the angles made by the nail as it exits from the terminal phalanx. Lovibond popularized this as the profile sign in his 1939 report on the diagnosis of clubbed fingers. He observed that in normal fingers, the nail projects from the nail bed at an angle of about 160°, but that this angle approached 180° in clubbed fingers (Figure B). Later, the hyponychial angle was proposed as a more reliable sign than the profile angle in the assessment of clubbing.

Phalangeal Depth Ratio. Estimation of the phalangeal depth ratio can be used to identify clubbing (Figure C). In the normal finger, the distal phalangeal depth is smaller than the interphalangeal depth. As connective tissue deposition expands the pulp in the terminal phalanx, this ratio becomes reversed. The phalangeal depth ratio appears to be independent of age, sex, and ethnicity in randomly selected populations. A similar ratio using distal and interphalangeal width can be determined, but it has not been studied as extensively as the phalangeal depth ratio.

Although the phalangeal depth ratio was originally described using plaster casts and shadowgrams, subsequent studies have reported the use of cali-

it can occur in association with extra-pulmonary malignancies as well as nonmalignant pulmonary diseases. Pachydermoperiostosis is a rare, congenital form of hypertrophic osteoarthropathy. Congenital clubbing, which usually has its onset in childhood, may represent a limited form of pachydermoperiostosis.

Unlike such physical findings as ascites and splenomegaly, the clinical impression of clubbing cannot be verified by simple imaging tests. Over the past century, many investigators have described possible reference standards for diagnosis of clubbing, including water displacement of the terminal phalanges, measurement of nail curvature using a device called an unguisometer, and measuring nail angles and ratios using plaster casts or shadow projections of fingers. None has been accepted as a criterion standard of diagnosis, and all are cumbersome and impractical as a method of verifying the clinical impression of clubbing. Therefore, physicians must rely solely on their skills in clinical examination to detect clubbing.

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pers on live fingers. To perform this measurement, the calipers should touch but not compress the tissue at the distal phalanx and the interphalangeal joint of the index finger during measurement. Baughman et al estimated that this technique takes no longer than 1 minute to perform. Visual estimation for the reversal of the phalangeal depth ratio has been suggested as a simple bedside technique for clubbing, but the precision of this method has not been tested.

Schamroth Sign. In 1976, Schamroth reported a new clinical sign that incorporated 2 of the clinical features of clubbing (Figure, D). Normal fingers create a diamond-shaped window when the dorsal surfaces of terminal phalanges of similar fingers are opposed. In the clubbed finger, the diamond becomes obliterated because of the loss of the profile angle and the increase in the soft tissue at the cuticle. Since its original description, this technique has become popular with physicians as a quick test to establish the presence of clubbing. The precision and accuracy of this sign, however, have not been formally tested.

Palpation. On palpation of the base of the nail bed, the examiner perceives that the nail is “floating” within the soft tissue, and in advanced cases may even be able to feel the proximal edge of the nail. This sign is best elicited by gently rocking the nail. The examiner grips the sides of the subject’s finger between the thumb and middle finger of each hand. Exerting downward pressure with his/her own index fingers, the examiner then rocks the distal and proximal ends of the subject’s nail, using the nail bed as a fulcrum.

METHODS

We used the MEDLINE database to search for English-language articles related to the clinical evaluation of clubbing that were published between January 1966 and April 1999. The MeSH heading hypertrophic osteoarthropathy, followed by the textword clubbing, were used in the following search strategy: physical examination/ or physical exam$; medical history taking; professional competence; sensitivity and specificity or sensitivity and specificity; reproducibility of result; observer variation; diagnostic tests, routine; decision support techniques; and Bayes theorem. This strategy resulted in a limited number of articles.

To expand the search, the titles and abstracts of all articles retrieved using the MeSH heading hypertrophic osteoarthropathy or the textwords clubbing and Hippocratic fingers were evaluated by each author independently. Based on this review, relevant publications were

![Figure. Appearance on Inspection for Clubbing](image-url)

A, Normal finger viewed from above and in profile, and the changes occurring in established clubbing, viewed from above and in profile. B, The finger on the left demonstrates normal profile (ABC) and normal hyponychial (ABD) nail-fold angles of 169° and 183°, respectively. The clubbed finger on the right shows increased profile and hyponychial nail-fold angles of 191° and 203°, respectively. C, Distal phalangeal depth (DPD)/interphalangeal finger depth (IPD) represents the phalangeal depth ratio. In normal fingers, the IPD is greater than the DPD. In clubbing, this relationship is reversed. D, Schamroth sign: in the absence of clubbing, opposition of the index fingers nail-to-nail creates a diamond-shaped window (arrowhead). In clubbed fingers, the loss of the profile angle due to the increase in tissue at the nail bed causes obliteration of this space (arrowhead).
retrieved and their bibliographies were evaluated for additional material. We also examined standard textbooks of physical diagnosis for information on the physical examination for clubbing. We attempted to contact the authors of articles in which more than 1 observer made a determination of clubbing to obtain additional data about precision of the examination for clubbing. Studies selected for data extraction were those in which quantitative or qualitative assessment for clubbing was described in a series of patients. Although our expanded electronic search identified 567 articles related to clubbing, only 16 studies met the criteria for inclusion in our analysis.

Study Characteristics
Clubbing differs from other physical signs evaluated in the Rational Clinical Examination series in that the lack of an accepted objective diagnostic criterion standard precludes meaningful assessment of the accuracy of clinical examination. However, our review of the literature on clubbing permitted us to evaluate quantitative indices used to distinguish clubbed from normal fingers; precision of physicians’ bedside clinical examination for clubbing; and accuracy of clubbing as a marker of selected diseases. We chose to limit our review of the quantitative indices of clubbing to studies of nail-fold angles and the phalangeal depth ratio, because of their potential applicability at the bedside.

Data Analysis
Pooled weighted averages were calculated for quantitative measurements of nail-fold angles and phalangeal depth ratios from data in studies of normal and diseased populations. Using data available in 2 articles on the precision of clubbing, we calculated \( \kappa \) statistics using the Stata statistical package (version 3.0, Computing Resource Center, Santa Monica, Calif). Sensitivities, specificities, and likelihood ratios of clubbing as a marker of specific underlying disease were calculated from original data when possible.

RESULTS
Quality of the Evidence
By consensus and using criteria previously developed for this series, we appraised the quality of the evidence contained in the articles that we retrieved.20 For reasons of selection bias, small sample size, and lack of an independent, blind comparison of the physical sign with a criterion standard, we classified all of the included studies as level 4, leading to grade C recommendations.29

Quantitative Indices of Clubbing in Normal and Disease States
Using plaster casts, shadowgraphs, and calipers, nail-fold angles and the phalangeal depth ratio have been measured in normal populations and in subjects with diseases associated with clubbing. The precision of these quantitative techniques is high. Using the shadowgraph method, Kitis et al30 examined the precision of measuring nailfold angles. Duplicate measurements of 51 subjects showed a difference of 0.2° in the mean of both the hyponychial and profile angles, with SDs of 4.6° and 4.3°, respectively. Although Waring et al15 found that the measurement of the phalangeal depth ratio with calipers on live fingers rather than plaster casts resulted in a loss of precision, Baughman et al26 investigated intrarater reliability and found an SD of only 0.0008. In the same study, 2 observers independently measured the ratio in 20 subjects, and the maximal difference in phalangeal depth ratio was 0.03.

Published data pertaining to the measurement of nail-fold angles and phalangeal depth ratios in disease-free individuals are summarized in Table 2. The pooled weighted mean values for the profile and hyponychial angle are 167.2° and 179.0°, respectively. The pooled weighted mean phalangeal depth ratio is 0.900. Do these measurements help distinguish those with from those without clubbing? The range was available for only 45 of the 161 disease-free subjects in whom the profile angle was measured, and none exceeded 176°. In studies of hyponychial angles, none of the 171 disease-free subjects had angles above 192°. The phalangeal depth ratio has been reported in 359 disease-free subjects, and in only 1 did it exceed unity.

Table 3 shows the nail-fold angles and phalangeal depth ratios in patients with diseases associated with clubbing. In such chronic diseases as cystic fibrosis and cyanotic congenital heart disease, the nail-fold angles and the phalangeal depth ratios are significantly higher than those found in disease-free populations. In case series of asthma and COPD, phalangeal depth ratios are slightly higher than normal values. However, it is impossible to exclude the possibilities that these series may have included patients with other pulmonary disorders associated with clubbing or that some patients were selected because they had clubbing.

In summary, in disease-free subjects, a phalangeal depth ratio above 1 is rare, the profile angle does not exceed 176°, and the hyponychial angle does not exceed 192°. To facilitate clinical use, we suggest accepting values of less than 180° for the profile angle (a straight line) and less than 190° for the hyponychial angle as describing normality.

PRECISION AND ACCURACY
Precision of the Clinical Examination for Clubbing
Four studies35–38 have reported the precision of physicians’ bedside examination for clubbing (Table 4). Although several of the case series describing the prevalence of clubbing in various disease states used multiple examiners, none reported intrarater reliability. We have excluded from this section reports of precision that used only casts or shadowgraphs for determination of precision, since potentially important clinical information from inspection or palpation of the live finger was not available to the examiners.

In an attempt to challenge the prevailing wisdom that clubbing was easily recognized, Pyke35 studied the precision of physicians’ global assessment for the sign. He enlisted 12 physicians and 4 medical students to examine 12 patients for the presence of clubbing. He purposefully chose pa-
tients who exhibited the full range of findings from normal to advanced clubbing. Overall agreement was fair ($\kappa = 0.39$). From the reported data, it was impossible to determine the effect of training on the examiners’ precision, but it was clear that the examiners used different criteria to identify clubbing. After completing their assessments, Pyke asked the examiners to define clubbing, and he received a wide variety of answers.

Rice and Rowlands used several quantitative indices, including phalangeal depth ratios, to assemble 11 patients who exhibited a range of findings from normal to advanced clubbing. Nineteen clinicians, all internal medicine staff or resident physicians, examined the patients for clubbing. Clubbing was judged to be present in 103 of the 209 subject examinations. As with Pyke’s findings, observer agreement was only fair ($\kappa = 0.36$).

Precision of physical examination for a variety of signs of pulmonary disease, including clubbing, was evaluated in a study in which 24 experienced physicians examined 4 patients each. The precision of the examination for clubbing was moderate ($\kappa = 0.45$). While several signs showed marginally greater precision (eg, wheezes, $\kappa = 0.51$), most signs had significantly lower precision (eg, displaced trachea, $\kappa = 0.01$; whispering pectoriloquy, $\kappa = 0.11$).

A 1965 study contrasted other reports of the precision of the physical examination for clubbing. Of 21 pulmonary signs, clubbing exhibited the highest rate of interobserver agreement among 9 experienced physicians examining 20 patients ($\kappa = 0.90$). This high level of precision may reflect either the experience of the examiners or a selection bias, since the degree of clubbing in affected patients was not described.

In summary, the precision of the clinical examination for clubbing has been found to be fair to moderate, with 1 study showing very high precision. Although precision was higher in the 2 studies that used more experienced examiners, neither of these studies reported their selection criteria for pa-

### Table 2. Reported Values for Profile Angle, Hyponychial Angle, and Phalangeal Depth Ratio in Disease-Free Subjects

<table>
<thead>
<tr>
<th>Technique</th>
<th>Population</th>
<th>No. of Subjects</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profile angle</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bentley et al.13 1976</td>
<td>Shadowgraph</td>
<td>25</td>
<td>168.3° (3.7°)</td>
</tr>
<tr>
<td>Kitis et al.20 1979</td>
<td>Shadowgraph</td>
<td>116</td>
<td>166.3° (4.3°)</td>
</tr>
<tr>
<td>Sinniah and Omar,31 1979</td>
<td>Shadowgraph</td>
<td>20</td>
<td>171.4° (5.5°)</td>
</tr>
<tr>
<td>Pooled weighted mean</td>
<td></td>
<td>161</td>
<td>167.2° (4.4°)</td>
</tr>
<tr>
<td><strong>Hyponychial angle</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regan et al.12 1967</td>
<td>Plaster casts, planimeter</td>
<td>10</td>
<td>186.1° (1.97°)</td>
</tr>
<tr>
<td>Bentley et al.13 1976</td>
<td>Shadowgraph</td>
<td>25</td>
<td>180.1° (4.2°)</td>
</tr>
<tr>
<td>Kitis et al.20 1979</td>
<td>Shadowgraph</td>
<td>116</td>
<td>177.9° (4.6°)</td>
</tr>
<tr>
<td>Sinniah and Omar,31 1979</td>
<td>Shadowgraph</td>
<td>20</td>
<td>180.7° (5.2°)</td>
</tr>
<tr>
<td>Pooled weighted mean</td>
<td></td>
<td>171</td>
<td>179.0° (4.5°)</td>
</tr>
<tr>
<td><strong>Phalangeal depth ratio</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waring et al.15 1971</td>
<td>Plaster casts, micrometer</td>
<td>160</td>
<td>0.895 (0.041)</td>
</tr>
<tr>
<td>Sly et al.26 1973</td>
<td>Plaster casts, micrometer</td>
<td>60</td>
<td>0.903 (0.043)</td>
</tr>
<tr>
<td>Paton et al.22 1991</td>
<td>Plaster casts, micrometer</td>
<td>85</td>
<td>0.890 (0.040)</td>
</tr>
<tr>
<td>Baughman et al.26 1988</td>
<td>Live fingers, calipers</td>
<td>54</td>
<td>0.920 (0.050)</td>
</tr>
<tr>
<td>Pooled weighted mean</td>
<td></td>
<td>359</td>
<td>0.900 (0.042)</td>
</tr>
</tbody>
</table>
Because many patients with clubbing have pulmonary disease, a relevant clinical question is whether clubbing separates those with COPD from those who have clubbing associated with pulmonary malignancy. In this way, 1 study\(^2\) assessed the usefulness of the phalangeal depth ratio in distinguishing patients with documented lung cancer from control subjects and those with COPD. Using calipers, Baughman et al\(^2\) measured the phalangeal depth ratio in both right and left index fingers in 109 patients with known lung cancer, 55 patients with COPD, and 54 control subjects. Of the 54 control subjects, none had a phalangeal depth ratio in excess of 1. In those patients who had a phalangeal depth ratio greater than 1, 40 had lung cancer and 5 had COPD alone (likelihood ratio, 3.9 [95% CI, 1.6-9.4]). Seventy patients who had a phalangeal depth ratio of 1 or less had lung cancer, and 49 with the same depth ratio had COPD alone (likelihood ratio, 0.7 [95% CI, 0.6-0.8]). We reclassified 1 subject in the COPD group who had a pulmonary nodule detected on chest radiography at study entry, which was subsequently diagnosed as adenocarcinoma of the lung.

These data confirm, as expected, that while a normal phalangeal depth ratio does not rule out lung cancer, an abnormal ratio implies an increased probability (likelihood ratio, 3.9; 95% CI, 1.6-9.4) of underlying lung cancer. Only 3 of the patients with COPD had a phalangeal depth ratio greater than 1.05, and none had a ratio greater than 1.1. Among those with lung cancer, there was no significant difference in the prevalence of clubbing (as defined by distal phalangeal finger depth/interphalangeal finger depth ratio) among the different histologic subtypes of lung cancer.

Kitis et al\(^3\) investigated the association of clubbing with the activity of inflammatory bowel disease in 327 patients. Clubbing was defined as a shadowgraph-measured hyponychial angle greater than 186°, which corresponded to 1.65 SDs above the mean value found in a group of 116 healthy controls. Disease activity was determined using an index incorporating the

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**Table 3. Reported Values for Quantitative Measures of Clubbing in Disease States**

<table>
<thead>
<tr>
<th>Disease State</th>
<th>No. of Subjects</th>
<th>Technique</th>
<th>Quantitative Measure</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>45</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio</td>
<td>39/45 &lt;1.0†</td>
</tr>
<tr>
<td>Sly et al.(^1) 1973</td>
<td>119</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio</td>
<td>0.910 (0.050)</td>
</tr>
<tr>
<td>Bentley et al.(^1) 1976</td>
<td>25</td>
<td>Shadowgraph</td>
<td>Profile angle; hyponychial angle</td>
<td>170.9° (4.1°); 184.5° (6.4°)</td>
</tr>
<tr>
<td>Paton et al.(^1) 1991</td>
<td>20</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio</td>
<td>0.911 (0.046)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>54</td>
<td>Live fingers, calipers</td>
<td>DPD/IPD ratio†</td>
<td>0.94 (0.06)</td>
</tr>
<tr>
<td>Bronchogenic carcinoma</td>
<td>109</td>
<td>Live fingers, calipers</td>
<td>DPD/IPD ratio‡</td>
<td>0.975 (0.099)</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>45</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio†</td>
<td>38/45 &gt;1.0†</td>
</tr>
<tr>
<td>Bentley et al.(^1) 1976</td>
<td>50</td>
<td>Shadowgraph</td>
<td>Profile angle; hyponychial angle</td>
<td>179.0° (6.2°); 194.8° (8.3°)</td>
</tr>
<tr>
<td>Lemen et al.(^1) 1978</td>
<td>18</td>
<td>Plaster casts</td>
<td>DPD/IPD ratio‡</td>
<td>1.010 (0.016)</td>
</tr>
<tr>
<td>Pitts-Tucker et al.(^1) 1986</td>
<td>73</td>
<td>Shadowgraph</td>
<td>Hyponychial angle</td>
<td>192°</td>
</tr>
<tr>
<td>Paton et al.(^1) 1991</td>
<td>44</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio</td>
<td>1.033 (0.079)</td>
</tr>
<tr>
<td>Cyanotic congenital heart disease</td>
<td>27</td>
<td>Plaster casts, micrometer</td>
<td>DPD/IPD ratio†</td>
<td>18/27 &gt;1.0†</td>
</tr>
<tr>
<td>Bentley et al.(^1) 1976</td>
<td>25</td>
<td>Shadowgraph</td>
<td>Profile angle; hyponychial angle</td>
<td>179.7° (4.8°); 195.5° (2.5°)</td>
</tr>
<tr>
<td>Asbestos exposure</td>
<td>50</td>
<td>Plaster casts, planimeter</td>
<td>Hyponychial angle</td>
<td>195.0° (9.6°)</td>
</tr>
<tr>
<td>Crohn disease</td>
<td>200</td>
<td>Shadowgraph</td>
<td>Hyponychial angle</td>
<td>183.5° (7.8°)</td>
</tr>
</tbody>
</table>

*DPD/IPD indicates distal phalangeal depth/interphalangeal depth.
†Individual values not reported; proportion of patients with DPD/IPD of greater than 1.0 reported.
‡Value reported in table is for right index finger only.
§Pooled weighted average for right index finger only.

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**Table 4. Interobserver Agreement of Clinical Examination for Clubbing**

<table>
<thead>
<tr>
<th>Source, y</th>
<th>No. of Observers</th>
<th>Observer’s Level of Experience</th>
<th>(k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyke;(^1) 1954</td>
<td>16</td>
<td>4 Medical students 4 Medical registrars 4 Surgical registrars 4 Senior physicians</td>
<td>0.39</td>
</tr>
<tr>
<td>Rice and Rowlands;(^1) 1961</td>
<td>19</td>
<td>Residents Fellows Staff physicians</td>
<td>0.36</td>
</tr>
<tr>
<td>Smyllie et al.(^1) 1965</td>
<td>9</td>
<td>5 Medical registrars 4 Consultant physicians</td>
<td>0.90</td>
</tr>
<tr>
<td>Spiteri et al.(^1) 1988</td>
<td>24</td>
<td>2 Senior house officers 14 Medical registrars 8 Consultant physicians</td>
<td>0.45</td>
</tr>
</tbody>
</table>
results of various laboratory investigations. The likelihood ratios for clubbing as a marker of active Crohn disease were 2.8 (95% CI, 1.8-4.1) and 3.7 (95% CI, 1.4-9.4) for ulcerative colitis. The sensitivity and specificity values were 0.58 and 0.79 for Crohn disease vs 0.30 and 0.92 for ulcerative colitis, respectively.

**SCENARIO RESOLUTION**

In the first case, you find that the patient appears to have increased nail curvature. You use calipers to estimate a phalangeal depth ratio of 0.90, and on inspection you estimate a profile angle of about 160°. Based on your knowledge of these values in disease-free subjects, you inform the respiratory therapist that her mother does not have clubbing. On the other hand, you find that the second patient has a phalangeal depth ratio of 1.1 and a profile angle of 180°, findings that are quite unusual for disease-free subjects or patients with COPD alone. You conclude that a search for bronchogenic carcinoma (or other causes of clubbing) should be undertaken.

**THE BOTTOM LINE**

For generations, medical students and residents have been quizzed at the bedside about the diagnostic features of clubbing. Confident though their inquisitors may be in their own ability to detect clubbing, the literature shows that interobserver agreement is only fair to moderate, and that the accuracy of techniques to detect clubbing has not been well established. Nevertheless, since nonhereditary clubbing is almost always a portent of serious disease, clinicians need to be as certain as possible about its presence.

Recognizing the limitations of the studies we have appraised, we recommend the following:

- In cases of diagnostic uncertainty, the phalangeal depth ratio may be helpful. This ratio can be measured using calipers at the bedside, and in disease-free populations rarely exceeds 1.0. An elevated ratio should prompt a search for underlying disease. Although patients with COPD have slightly higher ratios than do disease-free subjects, it is unusual for the ratio to exceed 1.05. A value in excess of this in a patient with COPD should prompt a search for bronchogenic carcinoma. Because most clinicians do not have calipers, visual estimation of reversal of the phalangeal depth ratio should be assessed.
  - Although the accuracy of clinicians’ bedside estimation of nail-fold angles has not been studied, the normal values for these angles have been established. A profile angle that approaches a straight line (180°) is rare in disease-free subjects, and in our opinion is easily identifiable at the bedside. Although the normal range of the hyponychial angle has also been defined, this angle is more difficult to estimate at the bedside.
  - No published evidence exists as to the diagnostic yield or the optimal strategy for investigating a patient with clubbing. Therefore, after completion of a thorough medical history and physical examination, clinical judgment must guide the choice of investigations.

**REFERENCES**

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