Digital Casts for the Study of Clubbing of the Fingers

By Robert B. Mellins, M.D., and Alfred P. Fishman, M.D.

Clinical research on the subject of clubbing of the digits has been handicapped by the lack of a reliable method for quantitation of clubbing. The present report describes an accurate method for describing the degree of clubbing in man and illustrates its use in detecting small changes in the degree of clubbing with time.

Methods

The aim of the method was to reproduce the contour of a digit by an accurate cast. Impressions for the casts of the fingers were made with an irreversible hydrocolloid material (Jeltrate).* The chief ingredient of this material is the potassium salt of alginic acid, a material extracted from the leaves of marine kelp. When water is added, the alginate forms an insoluble, gelatinous salt with calcium. The time required for setting is approximately 3 minutes and is adjusted by the presence of an inhibitor, sodium phosphate, which preferentially reacts with the calcium. When the inhibitor is used up, the calcium forms the insoluble calcium alginate gel. To provide the material with good mixing characteristics and a proper impression consistency, an inert filler, diatomaceous earth, is added. A complex fluoride is also added to prevent the impression material from inhibiting the setting of the stone when it is poured into the impression to make the positive mold. The alginate impression material will reproduce a line 0.0015 inches in width.† If the impression is kept moist and used without delay, there will be a change of less than 0.05% in the linear dimension.‡ The dental stone Hydroset,† a hemihydrate of calcium sulfate, was used for the positive casts; it expands by less than 0.1% on setting.‡

Results

The upper panel of figure 1 shows a cast of the third right finger of a 40-year-old woman with diffuse pulmonary fibrosis and marked digital clubbing in lateral view. For comparison, a cast of the third right finger of a healthy 36-year-old woman is shown in the lower

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*L. D. Caulk Co., Milford, Delaware.
†Jay E. Healey Co., Newark, New Jersey.
‡From the Departments of Medicine and Pediatrics, Columbia University College of Physicians and Surgeons, and the Cardiorespiratory Laboratory, Presbyterian Hospital, New York, New York.
Work done during Dr. Mellins’ tenure as Fellow of the New York Heart Association.
Supported in part by Research Grants HE-05741 and HE-08015 from the National Institutes of Health, U. S. Public Health Service.

Figure 1
Casts of the third right finger of a 40-year-old woman with digital clubbing (above) and of a normal 36-year-old woman (below).
panel of figure 1. The clubbed finger shows obliteration of the normal obtuse angle on the dorsal surface at the base of the nail, increase in the volume of the distal segment indicated by an increase in the anteroposterior diameter, and increase in the curvature of the nail. A close-up of the palmar surface of this same cast (fig. 2) demonstrates the fidelity of the method in reproducing such small details as the dermal ridges.

In figure 3, casts of the second right finger of an 18-year-old girl with tetrad of Fallot are shown in lateral view. An extreme degree of clubbing was present preoperatively. This was less marked 2 months after operation (middle cast); the angle at the base of the nail had deepened, and the curvature of the nail had decreased. By 7 months after operation (lower cast) the finger appeared more nearly normal.

Discussion

Several clinical features of clubbed fingers are difficult to describe quantitatively: (1) flattening of the normal obtuse angle on the dorsal surface of the finger at the base of the nail, (2) increase in volume of the distal segment of the finger, and (3) increase in the curvature of the nail in one or both planes.

Figure 3

Casts of the second right finger of an 18-year-old girl with tetrad of Fallot. The upper cast, made preoperatively, shows marked digital clubbing. The middle and lower casts, made 2 months and 7 months, respectively, after correction of the cardiac anomaly, show regression of the clubbing.

The digital casts used in the present study have simplified the detection and registration of small changes in these three parameters. In practice, the use of such models for comparative purposes in the same subject has been found to be superior to repeated photographs of the fingers.
ASSESSMENT OF DIGITAL CLUBBING

Summary
A method is described for the production of accurate casts of the digits using an alginate impression material. The use of such casts is illustrated with respect to changes in the degree of digital clubbing in tetrad of Fallot following total surgical correction.

Acknowledgment
The authors are grateful to Dr. Jack Budowsky for help in selecting the best material for making the casts and to Dr. James R. Malm and Dr. Frederick O. Bowman for referring their patients for study.

References

One Man's Opinion
When I consider how long and arduous is the task of making the truth an effective living reality even to just one human patient, who has been driven by his own suffering to seek the truth about himself and his life, then I must confess that the difficulties sometimes seem insurmountable which confront any effort to use art and literature and music as a vehicle for making truth meaningful to many. In such moments of discouragement even the best of poetry and fiction seems a watering down and disguising of truth so as to make it palatable, as though truth were too strong a drink for human palates. If this is true, then it may be fair to say that literature and art weaken the truth to enable many people to accept some fragments of it; whereas psychoanalysis attempts to strengthen one individual to the point at which he will be able to face and accept the whole truth. Yet no form of art or education has found out how to increase the receptive strength of Man in general. Perhaps this is the ultimate challenge which is faced today by education and by all cultural processes.—Lawrence S. Kubie. Neurotic Distortion of the Creative Process. Lawrence, Kansas, University of Kansas Press, 1958, p. 9.
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Circulation. 1966;33:143-145
doi: 10.1161/01.CIR.33.1.143

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