TRANSPLANTATION OF TOES FOR FINGERS

O. V. Labunskaya, M.D.
LENINGRAD, U.S.S.R.

FROM THE CHAIR OF ORTHOPEDIC SURGERY AND TRAUMATOLOGY CHIEF SURGEON PROFESSOR R. R. WREDEN, OF THE LENINGRAD STATE TRAUMATOLOGICAL INSTITUTE DIRECTOR F. I. MASHANSKY

The attempts at restoring defects of the skin on fingers after the methods of Italian plastics (Nicoladoni, Coucher) have led Nicoladoni to develop the idea somewhat further. Taking into consideration the functional importance of the thumb, Nicoladoni,3 as early as 1891, made an attempt to compensate a considerable defect of the soft parts of the thumb by means of a corresponding flap grafted from the anterior wall of the thorax. The results obtained were fairly satisfactory. The success of the case led him to further try the possibility of replacing lost parts of fingers or even the whole of an amputated finger. He intended inserting into the cutaneous rudiment of the thumb an osteoperiosteal graft, which had been slightly cracked with the view of giving it a bend. Unfortunately, he was prevented from applying the idea on a suitable case because another surgeon had performed an amputation. Following the same plan Nesske succeeded in two cases in restoring defects of the thumb with satisfactory cosmetic and functional results; the method has also been applied during the last few years by other surgeons and has been found to give satisfactory results. The operation is performed in two stages (Ritz) or sometimes even in one (Neigeisser). The former of the two surgeons, having split in half the fourth metacarpal bone, longitudinally sutured it together with the epiphysis into a cutaneous fold of the abdomen and then transplanted it on to the stump of the thumb; the results proved to be highly satisfactory. In 1898, Nicoladoni3 succeeded in obtaining even better results by utilizing the idea of an operation which had occurred to him a year previously, i.e., by substituting part of the second toe on the corresponding side of the body for a partial defect of the thumb.

Eiselsberg4 used the same method for replacing the distal half of the index. Likewise, Krause2 (1906) substituted for both cosmetic and functional considerations the big toe for the thumb. Klemm performed the same operation with excellent functional results in replacing a thumb which had been cut off with an axe at the metacarpophalangeal articulation. In two years sensation was found to be completely restored. The above observations show the possibility of an autoplastic substitution for part of a finger or even a whole finger, followed by its function being completely re-
stored. This is of particular importance in the case of the thumb and the index, but other fingers as well may be of great value, dependent on the patient's occupation. However, it should be borne in mind that patients submitting to the operation have to put up with a considerable amount of inconvenience in connection with a plaster-of-Paris bandage binding their wrist and foot for a period of from two to three weeks, the body remaining during this period in a bent posture (Fig. 2). This is impossible in the case of stout people and is not endured by those suffering from hysteria. A primary grafting under conditions of a fresh trauma should be considered decidedly unadvisable, for surgical interference within the region of recently injured tissues involves considerable danger and it appears to be hardly reasonable to sacrifice at this time a portion of an injured finger with the object of operating on sound tissues.

We perform the operation in two stages. The first stage consists in a small cutaneous flap being formed on the dorsal surface of the toe by means

---

**Fig. 1.**—Showing site of amputation of left index finger.

**Fig. 3.**—Appearance of left index finger (toe) three years postoperative.

**Fig. 2.**—Showing position necessitated by application of plaster case, in order to maintain the apposition of wrist to foot.
of a transverse arched incision, the apex of the curve being directed posteriorly. The tendon of the extensor is sectioned if possible above the edge of the cutaneous flap. The phalanx is split transversely at the level of the base of the flap either by means of an osteotome or a Liston’s forceps, or it is cut by means of a Gigli saw at a level which corresponds to the length of the defect. The distal end of the phalanx is then dislocated and the end of the thumb or finger stump is drawn up so as to come in touch with it, after a small dorsal flap of skin has also been formed on the stump and the tendon of the extensor has been exposed. The ends of the tendons are sutured together while a stable contact between the sectioned surfaces of the bones is ensured by means of suturing the surrounding soft tissues. The dressing material directly covering the wound may be fixed in place by strips of adhesive plaster and then a plaster-of-paris bandage joining the upper and lower extremities (the knee being bent) is applied. In 18 to 20 days the second stage of the operation is performed, which is analogous to the first stage, except for its being applied to the volar surface of the finger and toe and the tendons of the flexors and the incisions being sutured. In spite of a fairly long interval between the two operations, vascularization in the separated toe proves to be insufficient within the first week; the toe is cyanosed; cautious measures helping to keep it warm artificially should be administered to benefit its biologic processes. The first signs of restored sensibility appear only after several months have elapsed. Toes used for transplanting should always be taken from the same side of the body as the maimed finger. The highly irksome position in which the patients were obliged to remain for over a fortnight as a rule was borne fairly satisfactorily. In the case reported by Bier, Braun and Kümmel, it was necessary to cut
the bridge on the tenth day following the operation, as the patient was no longer able to stand this artificial symbiosis between hand and foot. Notwithstanding an aseptic postoperative course, this resulted in necrosis of the toe. Therefore, an interval of 18 to 20 days between the first and second stages of the operation may prove a failure unless the toe is duly taken care of after it has been finally separated.

In Soviet surgery we have so far had one case of a plastic operation with the object of substituting a toe for a lost finger.

CASE REPORT.—Patient V. A., aged 23, entered the clinic February 22, 1930. She complained of a defect of the left index finger which was the result of a trauma received seven months previously. A worker at the shoe factory "Skorokhod," the patient had had her left wrist caught in a press, and as a result of the accident her left index finger had been amputated (Fig. 1).

February 26, Professor Wreden, R. R., performed an operation after Nicoladoni's method with the object of transplanting the second toe (Fig. 2). The postoperative period took a normal course. Soon after the removal of the plaster-of-Paris bandage the transplanted toe began to show signs of restored sensibility to pain and temperature, while sensibility to touch was restored in three months.

At present, three years since the operation, the motor activity of the transplanted toe is normal (Figs. 3, 4 and 5). The patient is able to lace and unlace shoes, undo knots, etc., with the aid of the left index finger. Hence, the results obtained are excellent both from a functional and a cosmetic point of view.

REFERENCES

1 Eiselsberg: Arch. für klin. Chir., Bd. 61, S. 988.
3 Nicoladoni: Arch. für klin. Chir., Bd. 61, S. 606, 1900.