

Reconstructive Surgery in Leprosy Deformities

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INTRODUCTION

Until about two decades ago, surgery in leprosy consisted mainly of amputation of entirely useless parts of the extremities, or removal of sequestra in the case of non-healing plantar ulcers. Various operations on the affected peripheral nerves also were carried out. In the case of lagophthalmos, marginal tarsorrhaphy was found to be useful. Deformities of the face and ears were improved by excision of nodules and thickened skin, and nothing else.

During the past two decades, however, steady increase in the variety and number of operations performed on leprosy patients for various deformities, has completely changed the previous pessimistic outlook. Many orthopedic surgeons, who realized that a much wider need existed, applied modern methods of reconstructive surgery, as for any other deformity problem. Present day orthopedic, plastic and physiotherapeutic techniques, suitably applied to appropriate cases, have given such gratifying results, that rehabilitation of leprosy patients has been made easier. Because of marked improvement in function and appearance following reconstructive surgery, more cured patients are able to return to normal, active life.

In 1947, at the U.S. Public Health Service Hospital, Carville, Louisiana, Hatch and Riordin reported successful results following tendon operations on paralysed hands. Paul Brand, at Vellore, during the same period, demonstrated that most of the early deformities seen in leprosy patients could be corrected and prevented by applying modern orthopedic surgical methods. Thus he pioneered the reconstructive surgery on leprosy deformities.

Ideal and suitable procedures for various deformities of the hands, feet and face were attained, after trial of different

procedures, and assessment of their final result. The many operations now commonly performed are standardized, and adopted by surgeons in numerous centers all over the world. It is also stressed that during the pre- and post-operative periods, physiotherapy treatment is very important in the achievement of the final result.

REVIEW OF RECONSTRUCTIVE SURGERY OPERATIONS DURING THE PAST TWO DECADES

Deformity in leprosy is considered to be the main obstacle in total rehabilitation of leprosy patients. Early recognition of this fact has been responsible for evolving reconstructive surgery methods for correction of the various deformities seen in leprosy at the Christian Medical College and Hospital, Vellore, S. India, from the year 1950.

The various deformities seen in leprosy patients, in the hands, feet and face, are due to paralysis of peripheral nerves, causing motor and sensory paralysis. The most striking feature of nerve paralysis in leprosy is the regularity of its distribution throughout the body. The principles of reconstructive surgery in correcting the deformities are to restore muscle balance by tendon transfer, return lost function, and stabilize the joint. From the year 1951 to 1969 a total of 6,790 operations were performed for correcting leprosy-caused deformities. The number of operations steadily increased year by year, and on an average about 400 operations are now carried out yearly. In the year 1965, the highest number of operations, viz. 529, were performed (Fig. 1).

The program of surgical treatment in the peripheral clinics was intensified during 1968 and 1969, when many patients were operated in their own centers who hitherto came to the main hospital for surgery. The decrease in the number of operations during these two years is due to this factor (Table 1).

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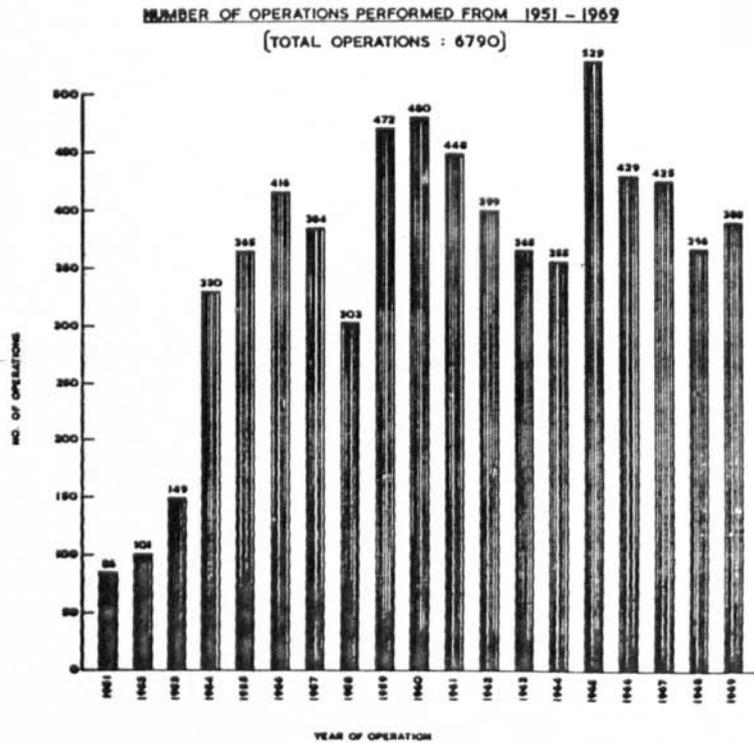


FIGURE 1

The operations are grouped according to the different regions, such as hand, foot, face, bone, joints, skin and nerves. The majority of the operations were for hand deformities, totalling 4,626. Next come operations performed on the foot, 1,114 (Table 2).

The many operations involving the skin, totalling 590, are analyzed separately. Of these, free grafts numbered 227 and web plasty 146. Skin graft procedures are required in deformities of long duration which result in marked skin contracture. The correction of the deformity is not possible without skin graft (Table 3).

The next largest group of operations were on the bones, totalling 864. These included arthrodesis of digits of the hand and numbered 248. Deformities of the hand of long duration result in subluxation and destruction of the joint. In such cases arthrodesis is the only alternative to restore functional position of the hand. During the follow-up study it was noticed that the joints of the finger, even though arthrodesed, were in good functional position; the

operation helped the patient in the normal use of the hand, and also improved its appearance.

On review of the results of arthrodesis of digits of the hand in 129 cases it was found that satisfactory fusion of the joint was

TABLE 1. Department of orthopaedics and reconstructive surgery operations performed from 1951 to 1969.

Year	No. of Operations	Year	No. of Operations
1951	86	1961	448
1952	101	1962	399
1953	149	1963	365
1954	330	1964	355
1955	365	1965	529
1956	416	1966	429
1957	384	1967	425
1958	303	1968	366
1959	472	1969	388
1960	480		
Total			6,790

TABLE 2. Groups of operations

Operation	No. of Operations
Hand	4,626
Foot	1,114
Face	312
Bones	864
Joints	243
Skin	590
Nerves	397

achieved in 77 per cent of cases. 'K'-wire fixation was used in most of the cases. Osteomyelitis and joint destruction following plantar ulcers in the foot needed curettage and metatarsectomy and sequestrectomy in 367 cases. A variety of other bone procedures, including bone graft and osteotomy, were also carried out (Table 4).

Different kinds of minor operations on tendons, totalling 469, included procedures

TABLE 3. Operations on skin.

Operation	No. of Operations
Skin graft	227
Z plasty	34
Web plasty	146
Pedicle tube/N.V. graft	99
Release contracture	84
	590

like hooding correction, tenolysis, tenodesis and also tendon transplant operations of hands and feet. In this group, the routine tendon operations done for claw-deformity of hand and foot-drop are excluded. These procedures are listed separately. Postoperatively, it is not unusual to encounter certain deformities which need correction according to the methods mentioned above.

It is of particular interest to mention 25 cases of palmaris longus tenodesis, a procedure occasionally performed to restore intrinsic function in claw-hands. This has given satisfactory results more by

virtue of its tenodesis effect than as an active motor tendon.

Multiple tendon transfer operations for correction of wrist-drop deformities are also included in this group. Hooding deformity is seen in the fingers following prolonged contracture where there is damage to dorsal expansion. This is diagnosed by the Hooding sign which is present in these cases. On 103 cases Hooding correction was made (Table 5).

A total of 471 cases of tibialis posterior tendon operations were performed for correction of foot deformity. Many modifications of the tendon transfer have been used in the past. Transfer of the tendon through the interosseous and circumtibial routes is most commonly used. Because of the complications associated with the interosseous approach, the circumtibial route is now preferred.

TABLE 4. Operations on bones from 1951-1969.

Operation	No. of Operations
Arthrodesis of fingers	248
Curettage	217
Metatarsectomy	83
Sequestrectomy	67
Bone graft	53
Arthrodesis of wrist	49
Amputation of leg	42
Claw-toe corr./arth.	25
Amputation of fingers	24
Amputation of toes	22
Osteotomy	18
Arthroplasty	8
Others	8
Total	864

Operations on the face included the following:

Rhinoplasty	100
Eye-brow graft	97
Temporalis transfer and tarsorrhaphy	48
Face lift and fascial graft	67
TOTAL	212

TABLE 5. Other operations on tendons.

Operation	No. of Operations
Littler's	14
Checkrein	34
Tenolysis/tenodesis	74
Palmaris longus tenodesis	25
Hooding correction	103
Tenotomy	16
Tendon transfer—hand	149
Tendon transfer—wrist	27
Tendon transfer—foot	27
Total	469

The largest group of operations (Table 6) related to tendon transfer operations on the hand, as follows:

Extensor flexor, many-tailed	780
Sublimis transfer	593
Extensor, many-tailed	577
Fowler's operation	137

The procedures named above were carried out for the correction of claw-hand deformity by transfer of tendons, such as the sublimis, extensor digitorum of index and little finger, and extensor carpi radialis with tendon graft (Fig. 2). This shows that, in the early years, sublimis transfer operations were popular; the largest number of operations were performed in the year 1963. During subsequent years however, this was less frequently done. About that period, after realization of the post-operative complications following sublimis transfer, the extensor many-tailed operation was developed, which has been increasingly used during the following years. Tendon grafts to the respective fingers were routed along the dorsal aspect of the hand through the intermetacarpal spaces. This operation gave satisfactory results, and during 1959-60 a large number of operations were done according to this method. The follow-up on these cases showed many instances of poor results, which were attributed to tendon adhesions in the pathway and also difficulty in re-education. At that time the

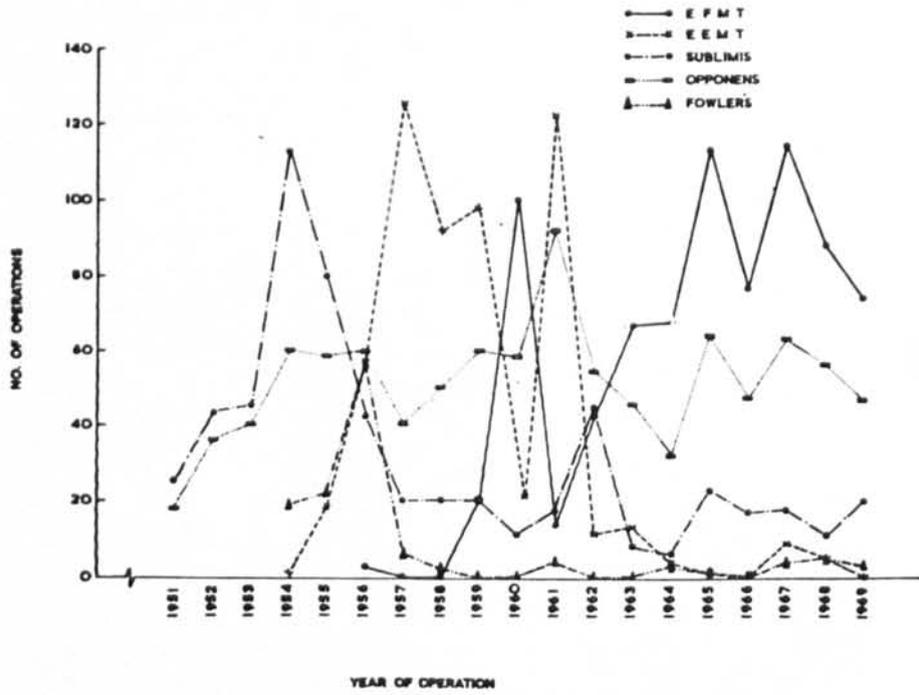
routing of the tendon and the graft on the flexor side of the forearm along the carpal tunnel were developed, and became quite acceptable, since complications were minimal compared to those in other procedures. So much so, during the past six years, this has become the routine operative procedure for correction of claw-hand deformity. All through, sublimis transfer operation is also done on appropriate cases because of the simplicity of the procedure and ease of re-education. In those cases where the two methods described were not suitable, Fowler's operation was done. This has numbered 137 so far (Fig. 3).

The combination of paralysis of ulnar and median nerves gives rise to complete clawing of all the fingers, with thumb paralysis. The opponens replacement for thumb deformity was the largest of any single operation, 978 in our series (Fig. 4). In almost all cases the sublimis tendon of the finger, preferably ring finger, was used. This procedure has undergone various modifications in the course of years to obviate some of the post-operative complications and poor results which were seen in the cases that failed. Recently the results of

TABLE 6. Operations on hand from 1951 to 1969.

Operation	No. of Operations
Arthrodesis of wrist	49
Exploration of fingers	51
Nerve stripping	57
Tenolysis/tenodesis	74
Abductor/Abductor replacement	86
Hooding correction	103
Fowler's operation	137
Web plasty	146
Tendon transplant	176
Arthrodesis of fingers	248
Exploration of nerves	338
E.E.M.T.	577
Sublimis transfer	593
E.F.M.T.	780
Opponens replacement	978
Others	233
Total	4,626

TENDON OPERATIONS ON HAND - FROM 1951 TO 1969



YEAR OF OPERATION

FIGURE 2

OPERATIONS ON HAND FROM 1951 - 1969

(TOTAL OPERATIONS : 4626)

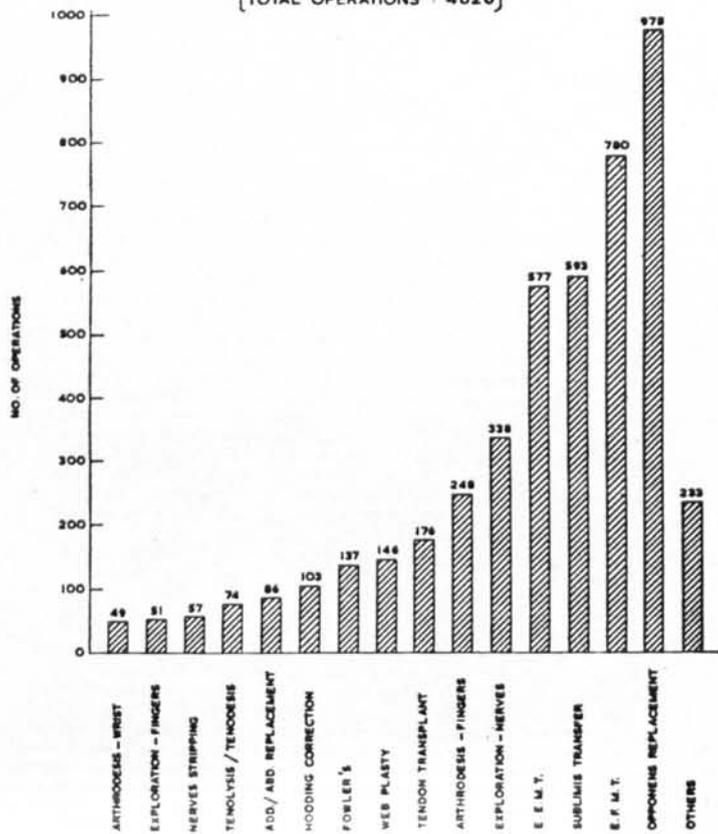


FIGURE 3

DIFFERENT KINDS OF OPERATIONS - FROM 1951-1969

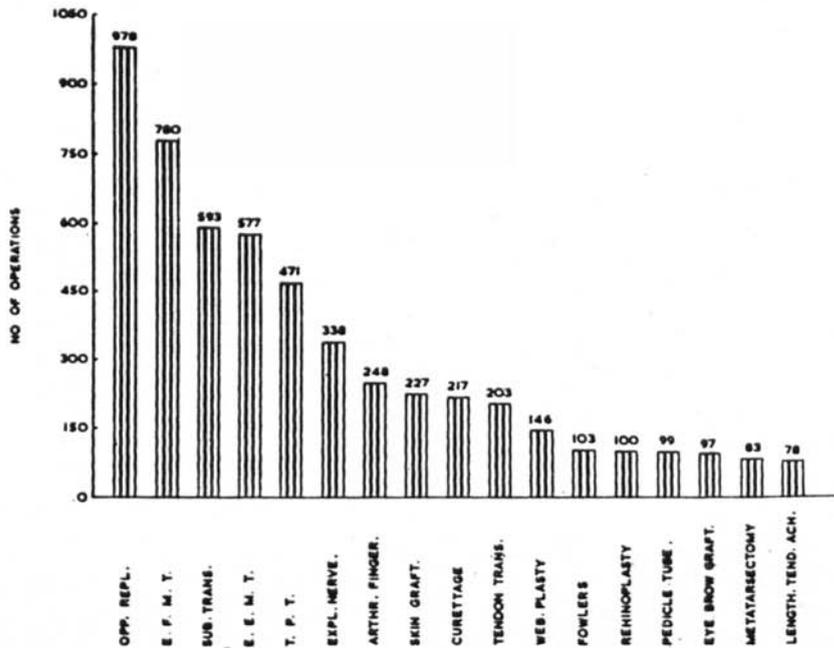


FIGURE 4

631 cases were reviewed in order to study associated deformities and their relationship to the different types of operation. Of these, 77 cases, which were studied separately and compared with the rest of the cases, were handled during the past two years, following definite techniques at operation with regard to routing of the tendon, its suture, tension of the tendon and position of the thumb and wrist joint at the time of suture. The comparative results between the two groups show that the modified technique adopted in the recently operated cases has obviated the poor results and complications which used to be seen more frequently following the previous operations.

TRAINING PROGRAMS FOR SURGEONS AND PHYSIOTHERAPISTS

From the year 1961 regular training programs in reconstructive surgery have been conducted, and to date 37 surgeons have received training (Table 7). A center with an experienced surgeon, a physiotherapy unit and an operation theater plays an important part in providing facilities for recon-

structive surgery. As more surgeons become available many such centers will be able to take care of the large number of patients who will be benefited by reconstructive surgery.

From 1958, the Department of Physiotherapy attached to the Hand Surgery Unit has been conducting a regular course, of nine months duration, to train physiothera-

TABLE 7. Trainees in reconstructive surgery in department of orthopaedics and leprosy reconstructive surgery (1961-1969).

Year	No. of Trainees
1961-62	6
1962-63	11
1963-64	1
1964-65	7
1965-66	4
1966-67	2
1967-68	2
1968-69	4
Total	37

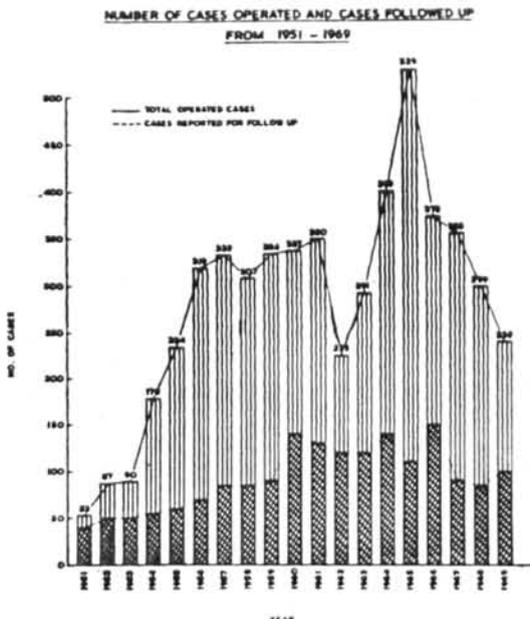


FIGURE 5

py technicians. These technicians, who were sent by many leprosy centers, both in India and abroad, are now rendering useful services in their centers after this training. However skillful the surgeon may be, no surgical program is complete without trained physiotherapists. They also play an important part in the treatment and prevention of early deformities and plantar ulcers. Their usefulness has been fully realized and many leprosy centers are staffed with trained physiotherapy technicians. Up to date, 186 physiotherapy technicians have undergone this training.

MOBILE SURGICAL CLINICS

A regional center tends to be crowded with patients waiting for operations. At the same time the expense involved in travel and waiting and the time-consuming physiotherapy are beyond the means of the average patient. Regular visits to the out-reach clinic by a mobile surgical team, consisting of surgeon, technician and assistants with equipment, will enable the team suitably to advise treatment on problem

cases, operate on cases which are preselected and prepared by the physiotherapy technician, and review post-operative cases. Such visits at regular intervals, covering several centers, will help a large number of patients who are in need of advice, surgical treatment and reconstructive surgery. Any problem cases needing special care can be moved to the regional center. It has been found that, in spite of some of the disadvantages, such a program of mobile clinics has met the needs of those who could not afford to go to a large regional surgical center for surgical treatment.

SUMMARY

The growth and development of reconstructive surgery in leprosy deformities are reviewed. During the past two decades, up to the year 1969, a total of 6,790 operations were performed on leprosy patients in the Orthopaedic and Leprosy Reconstructive Surgery Department of Christian Medical College and Hospital, Vellore, S. India, and these cases are analyzed.

Various operations on different regions are cited separately and analyzed. The total number of operations for claw-hand deformity are reviewed, and the different procedures for this condition during this period also are analyzed.

Tendon transfer operations for correction of thumb paralysis are carried out in a large number of cases. The favorable results of the operations done during the past two years are compared with the over-all result of operations done prior to this period. The fact is emphasized that standardization of techniques and methods is an important factor in achieving good results following surgical procedures.

Brief mention is made of the training program for surgeons and physiotherapy technicians, and mention is made of experience with a mobile surgical clinic program, which is able to extend surgical treatment and allied services to many out-reach clinics which do not possess facilities for surgical treatment.