

Study of leprotic claw hand in western India

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Abstract:

Background: Leprosy is not only a communicable disease but also a disabling one because of deformities. The externally obvious deformities cause a marked handicap in social life apart from their disabling aspect to the individual. The aim of present study is to know the magnitude of the problems and to evaluate different factors that can influence the development of deformities of limbs in our center of Civil Hospital, Ahmedabad.

Materials and Method: This prospective comparative observational study was carried out on patients of Department of Burns & Plastic Surgery, Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat, India from December 2016 to December 2018 over period of two years in which total 50 adult subjects were included. The incidence of claw hand deformity with gender specific distribution and pattern of deformity was studied. Depending on deformity they were either operated for static or dynamic procedure and they were evaluated for improvement of function with angle between joints and grasp function.

Result: The incidence rate was higher in men and involving adult age more commonly. Deformities occurred after 2-5 years and combined pattern claw hand commonly involved. It was evident that Dynamic procedure had good results over static procedures. Lasso procedure showed better outcomes and without preoperative as well as postoperative physiotherapy complete results can't be obtained.

Conclusion: Our study enhances the knowledge of leprotic deformities and may play a role in the prevention and treatment of future deformities. Timely intervention with appropriate procedure supplemented with physiotherapy results in good outcome. various reconstructive surgeries for claw hand in leprosy patient is very much helpful for improvement in functional level of hand and thereby improving individual's quality of life. in term, this is really a true 'rehabilitation'.

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I. Introduction

Leprosy is not only a communicable disease but also a disabling one because of deformities. The externally obvious deformities cause a marked handicap in social life apart from their disabling aspect to the individual.¹ This applies to all the deformities irrespective of their cause. In leprosy the situation is further complicated by the general ignorance, prejudice, fear and social stigma attached to it.² Leprosy is unique in its peculiarly intense reaction. Most of the deformities in leprosy can be prevented and those, which cannot be prevented, can be corrected by reconstructive surgery.³ Prevention is not only better than correction but also within the reach of every leprosy worker and paramedical workers with the minimum of training and inexpensive equipment.⁴ The present study was undertaken to know the magnitude of the problems and to evaluate different factors that can influence the development of deformities of limbs.

II. Material and Methods

This prospective comparative observational study was carried out on patients of Department of Burns & Plastic Surgery, Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat, India from December 2016 to December 2018 over period of two years. A total 50 adult subjects (both male and females) of aged ≥ 10 years were included for in this study.

Study Design: Prospective comparative observational study

Study Location: This was a tertiary care teaching hospital based study done in Department of Burns & Plastic Surgery, Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat, India

Study Duration: December 2016 to December 2018

Sample size: 50

Inclusion criteria:

1. The deformity should be either stabilized or fully developed.
2. Overlying skin should be free from active leprosy.
3. Normal range of passive joint motion is required for most successful results from tendon transfers.

Exclusion criteria:

1. Active leprosy with wound dermatitis or skin reactions are contraindications for surgery.

Procedure methodology

Patients included in study were evaluated clinically and for routine pre-operative investigations. Preoperative physiotherapy is given with Improvement of local condition of skin by application of emollient locally and after proper evaluation were posted for surgical procedure under regional anaesthesia.

Surgical Procedures:

All the surgical procedures are done either in supraclavicular block or in local anaesthesia. Correction of claw hand can be achieved by:

- 1) Replacement of intrinsic muscle by tendon transfers.
- 2) Preventing hyperextension of Metacarpophalangeal joints by tenodesis or capsulorrhaphies.

The reconstructive surgical procedures used for the correction of paralytic deformities of leprosy are:

Dynamic procedures They involve Stile's Bunnel Method, Lasso method, Fowler's Concept, Brand Extensor Procedure, The Palmaris Many Tailed Procedure, Riordan's Many Tailed Graft,.

Static: Here the deformity is corrected by procedures which maintain functional position permanently. These procedures included Tenodesis, Capsulorrhaphies and Capsulotomies of MCP joint , Mikhail's Bone Block Procedure, Dermodesis. Also various thumb procedures were included Opponenplasty, Z plasty and arthrodesis.

Protocol followed after surgery:

- 21 days of immobilization
- Stitch removal on 21st day
- Physiotherapy immediately for at least 2 months
- Final results evaluated at 6 months.

Method of Evaluation:

- 1) By measuring angle of IP and MCP joint.
- 2) Assessment of grasp function.

All results of surgery in this study is evaluated on above two criteria mentioned. All information was noted on clinical Proforma and was studied later

III. Result

A study of 50 cases of hand deformities in leprosy was carried out. In this study no cases was found in the 0-10 age group. Maximum number of hand deformities were found in 30-50 years age group. In this study, deformities of hand were more common in males then female. Ratio of male to female affected is about 3:1. In 52% of the cases deformity occurred between 2-5 years of age. In 32 %, it occurred after more than 5 years and in 16 %, it occurred before two years of age. Pattern of deformity occurred more with combined claw hand followed by ulnar claw deformity as shown in Table 1.

Table 1.

Pattern of deformity	No. of patients
Ulnar claw	19 (38%)
Median claw	0
Combined claw	31 (62%)

out of the 50 patients operated, 30 of them underwent dynamic procedure accounting to 60% Of the total and 20 i.e. 40% underwent static procedures. In the total of 50 patients we had, different types of surgeries advocated to each one according to the indication as shown in Table 2. Here out of 30 dynamic procedure 27 patients had undergone LASSO procedure and 3 patients had undergone Bunnel's procedure.

Table 2.

Sr No.	Type of surgery	No. of patients
1	Lasso	27
2	Bunnel	3
3	Dermodesis with contracture release	13
4	Zancolli's capsulorrhaphy	5
5	MCP joint arthrodesis	2

Whenever there is a combined type of deformity due to involvement of median nerve thumb deformity is also present. In such cases Opponenplasty was also done as an extra procedure for good results. So in total 18 patients Opponenplasty was added to other dynamic procedure. 20 patients had undergone static procedures, Out of which 13 patients had undergone Dermodesis with contracture release with full thickness skin grafting. 5 patients with contracture of two or three fingers had undergone Zancolli's capsulorrhaphy. 2 patients with severe joint contracture underwent Arthrodesis.

Table 3. show that out of 27 patients who had undergone LASSO procedure, 22 (78.04%) were having good results while 1 patients (7.33%) had poor results with 4 patients (14.63%) having an intermediate results. Bunnel's procedure was performed in 3 patients. Analysis showed that in our study, good results were obtained in 2, Fair results were obtained in 1. Dermodesis with full thickness grafting was done in 13 patients, out of which 8 showed good results, 4 fair results and 1 poor. Zancolli's capsulorrhaphy was done in 5 patient with one patient grade I, two grade II and two patients grade III results. Only two patients had undergone arthrodesis out of 19 static procedures.

Out of the total of 50 patients in whom reconstructive surgeries were performed, 30 patients underwent the "Dynamic" type of surgery and 20 the "static" variety. These results indicate that combining both types of dynamic procedures. A total of 23 patients accounting to 76.08% had good results, 5 of them had fair results accounting to 17.39% and 2 had poor results accounting for 6.52%.

The "Static" procedures were performed in 20 patients out of the total of 50. The table gives us a glimpse of the results. Out of the total of 20 static procedures performed 9 had good results accounting to 48.25% and 6 had fair results accounting to 32.75% whereas 4 gave poor results corresponding to 19%. The above results are evidence to the fact that good results are obtained more in dynamic (78.06%) than in static (48.25%).

Table 3.

	Name of Procedure	Good	Fair	Poor
1	Lasso	21	4	2
2	Bunnel	2	1	0
	Total (percentage)	23(46%)	5(10%)	2(4%)
1	Zancolli's Capsulorrhaphy	1	2	1
2	Dermodesis ,contracture release	8	3	2
3	Arthrodesis	0	1	1
	Total (percentage)	9(48.25%)	6(32.75%)	4(19%)

So, we can see that out of 50 patients 32 of them accounting to 64% had good surgical result, 11 i.e. 22% had fair operative result and 7 i.e. 14% had poor operative results.

IV. Discussion

A study of 50 cases of hand deformities in leprosy was carried out. Their age incidence, sex incidence, clinical features and other findings were analysed and were compared with similar other studies. Low incidence of deformities in children is due to milder form of disease is more prevalent in children, shorter duration of disease in children, increased tendency towards self-healing and low incidence of reactive episodes.⁵ In addition to these factors, the cumulative effect of permanent deformity leads to high deformity rate observed in adults. High incidence of deformities in male is most likely due to environmental factors. Males by virtue of their occupation are engaged in rougher manual work, outdoor habits and smoking are likely to be resulting in the deformities.⁶ Low incidence of deformities in females are due to Overall incidence is lower in female, Female suffer from benign form more often like non lepromatous leprosy, Females tend to suffer less nerve damage than male.⁷ In 52% of the cases deformity occurred between 2-5 years of age. The onset of deformity could be up to four times longer among the lepromatous than among tuberculoid, whereas deformity seems to be an

earlier manifestation among the tuberculoid than among the borderline patient. Occurrence of deformity depend on involvement of nerve, for tuberculoid leprosy nerve involvement is earlier whereas in lepromatous leprosy due to slow progress of disease, nerve involvement occurs in the late stage. Most of the patients in the present study were of borderline type of leprosy with single or isolated nerve damage. Hence, complete claw hand was more common than incomplete claw hand.⁸ It is important to decide pre operatively by examination as to which type of surgery the patient will require. Here most of the patients selected were with mobile claw hand, for which the dynamic procedures are more suitable. They observed poor results with dynamic tendon transfer in joint or soft tissue contracture. In patient with soft tissue contracture and joint stiffness static procedures are preferable. In the total of 50 patients we had, different types of surgeries were advocated to each one according to the indication. LASSO procedure is maximally advocated here, because it is easy to perform and give good results. It is the transfer of dynamic tendon of the synergistic muscle group, this helps in post-operative teaching, which becomes very easy for persons of all age groups and persons with low intellectual level. Disadvantage of "LASSO" is Swan neck deformity i.e. Hyperextension at proximal IP Jt. & Flexion at MCP & distal IP joints.⁹ Comparison with one series performed by Kumar A. et al , they have operated 99 on patients & shown that in 88 patients (87.69%) had good results while rest of the 11 patients having a fair and poor results. They founds Swan neck deformity, recurrence of skin contracture in 11 patients.¹⁰ Nevertheless this complication occurs in long term measures. LASSO cannot be applicable to cases with poor tone of the flexor digitorum superficialis.¹¹ In such cases BRAND procedure is performed, where powerful extensor group of muscle is used instead of FDS. Brands technique was used by V. P. Lakhan, S.S. Yadav on 32 patients out of which they obtained good results in 29 patients and fair results in 3 patients.¹² "BUNNEL" is another good option for dynamic tendon transfer, because in India presentation of the patient is late, some soft tissue contractors is always there. In Such cases BUNNEL procedures gives good results. Here, the transferred tendon is attached to an extensor expansion rather than to an A2 pulley. Basically it is prototype of LASSO but distal attachment of transferred tendon is distal than in LASSO.¹³ No series is available for comparison of results with our present study. Static procedures are not physiological as they give only functional position to the patient and are applicable only in severe deformity with presence of soft tissue contracture. Static procedures are also preferred in a case where postoperative education is difficult. Dermodesis with contracture release with full thickness skin graft is the easiest of all the static procedure and can be applicable to a large group of patients with good results.¹⁴ Zancolli's capsulorrhaphy is recommended only in patients with contracture of one or two fingers i.e. isolated ulnar claw and is a good option when a tendon transfer is not possible. Results are comparatively inferior to another static procedure because procedure demands technical expertisation.¹⁵ No series is available for comparison of result. "Arthrodesis" is done in cases where severe joint contracture is present and in such cases no other method is possible.¹⁶ Here patients were given a functional position for rehabilitation. Main disadvantage of static procedures were that they become ineffective after a long period. The above results are evidence to the fact that good results are obtained more in dynamic (78.06%) than in static (48.25%). As such, this comparison is not valid because selection of patient in both the groups is different. Severity of disease and its generalised nature in patient also are selected for static procedure was responsible for inferior results in static procedures. So, we can see that out of 50 patients 66% had good surgical result, 24% had fair operative result and 10% had poor operative results. The overall benefit to the patient in improvement of hand function will far out weight, the poor results in this study. Even though results of overall Surgery are good (66%), 10% have poor results due to: 1) Faulty preoperative patient selection: Mobile claw hand is very much important for obtaining good results in dynamic tendon transfer procedures. 2) Prolonged postoperative physiotherapy is required for obtaining better result. For evaluation of complications more long term follow up is required. In this study except for minor problems with wound healing and infection no major complication was observed.

V. Conclusion

In Conclusion maximum number of cases of hand deformity are found in the age group of 30 - 50 years. No case was found in the 0 - 10 years age group. Deformities of hand are more common in males than in females. In more than half of the total patients, the onset of deformity was between 2 - 5 years .Combined claw hand was found in maximum number of patients of this study. It was found longer the duration of disease more severe the deformity and poorer were the result of surgery. Dynamic procedures gives definitely better results than static procedures. LASSO proves to be most effective means of dynamic procedure for mobile claw hand. Preoperative selection of patient is most important for deciding which type of surgery should done. Otherwise results obtained will be poor. Without preoperative as well as postoperative physiotherapy complete results can't be obtained. So this is one of the most important consideration in planning surgery. Surgery over isolated ulnar claw hand gives better result than combined claw hand deformity. No major complication was observed except minor wound infection. But for evaluation of durability of this various reconstructive procedures and their complication, long term follow up is required.

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