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Original Article

Community Medicine Section

Reconstructive Surgery Camp for Leprosy Deformities in a Tertiary Hospital: An Example of Service Delivery at Low Costs

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ABSTRACT

Introduction: Seventy percent of all cases of leprosy in the world occur in India. 8,462 new cases of disability were reported in India between 2010-11. Reconstructive Surgery Camps (RSC) provide free of cost plastic surgical expertise to patients of leprosy with deformity.

Aim: The aim of this article was to report the outcomes of a RSC in a tertiary level university hospital in India. We also described the types of deformities in the patient group and the cost of conducting such a camp.

Materials and Methods: The RSC involved 130 patients with leprosy related deformities operated by a team of plastic surgeons in a tertiary university hospital over 5 days. Health workers of the National Leprosy Elimination Program identified patients at community level. The camp was funded by the central government of India and the patients were provided incentives for undergoing treatment.

Results: Plantar ulcer was the commonest deformity (51.5%) while lagopthalmos (9.2%) was the least common deformity in the patient group. The overall complication rate in our study was around 10.6% (n=11). The total cost of this camp was 730,000 rupees (£7029.9).

Conclusion: Reconstructive surgery in a camp setup is a low cost alternative of correcting leprosy related deformity. It also provides valuable practical experience in reconstructive surgery to surgical trainees. Tertiary hospital based camps for conducting large-scale surgeries may be a cost effective alternative to reduce waiting lists in public health sectors. Long-term studies monitoring patients operated in a camp setting would be worthwhile.

Keywords: Leprosy related deformity, Low cost, National Leprosy Eradication Program

INTRODUCTION

Leprosy is a disease that has plagued the human race since the beginning of time. Though it has been eliminated from most developed countries, it still exists in South Asia and Latin America where it retains the moniker “The Living Death”.

Leprosy currently affects approximately a quarter of a million people throughout the world with 70% of these cases occurring in India [1]. Though the number of new cases of leprosy in India has decreased dramatically with a prevalence of less than 1 case per 10,000 individuals, certain rural areas and urban slums continue to experience up to 5 times the number of leprosy cases as the national average [2]. India continues to record the highest number of new cases of leprosy in the world and has 55.5% of the total new worldwide cases [1]. In Gujarat, leprosy achieved elimination status in 2004. The prevalence of leprosy in Gujarat has been reducing, it decreased from 2.65 per 10,000 population in 2003 to 1.87 per 10,000 in 2007. The most recent prevalence data reports a rate of 1.16/10,000 population in Gujarat in 2014. Among different districts, Panchmahal has the highest prevalence with five talukas having prevalence of >2 as of 2008.

While Multi Drug Therapy (MDT) for leprosy arrests all forms of the disease but problems with patient compliance lead to the development of various deformities. 8,462 new cases of disability were reported in India between 2010-11[3]. Reconstructive surgery facilities are lacking in most centers in India. Singh et al., reported no reconstructive surgery centers in Panchmahal district in Gujarat with 100% patients with reactions being managed in peripheral centers. None of the patients with deformities were being referred for surgery. She also reported lack of training and awareness among vertical staff for Disability Prevention and Medical Rehabilitation (DPMR) [4]. In this scenario, reconstructive surgery camps for leprosy deformity are the need of the hour. These camps provide free of cost plastic surgical expertise to patients of leprosy with deformity and can hence reduce burden of deformity in the community. There are 3 recognised reconstructive surgery centers in Gujarat: civil hospital, Ahmedabad; Sir Sayajirao General Hospital (SSGH), Vadodara and New Civil hospital, Surat. SSGH in Vadodara conducts annual reconstructive surgery camps for leprosy deformity [5].

Cost of reconstructive surgery for leprosy can range anywhere between 16,000 INR to 100,000 INR depending on type of surgery and the hospital setting [6].

The aim of this article was to report the outcomes of a Reconstructive Surgical Camp (RSC) in our hospital. We also described the types of deformities in the patient group and the cost of conducting such a camp.

MATERIALS AND METHODS

Study Design

This was a retrospective review looking at the conduction, outcomes and costs of a RSC for leprosy patients, held in a tertiary hospital in India in January 2013.

Setting and Participants

The camp was conducted over a five-day period in the Department of Plastic Surgery. Community health workers trained under the National Leprosy Eradication Program (NLEP) identified the patients at the community level. These included ASHA workers and general health care staff who performed house to house visit to search for cases who were then confirmed by the team of medical officers at PHC and District centers. They also spread awareness in the community using posters and pamphlets in the local language that were distributed at the Panchayat (village level elected council)

offices, schools and dairy offices. Source of patients for these camps were either voluntary reporting or patient referred by PHC/ Secondary care units. These were limited to districts allocated to the institute but some direct patients from neighboring states were also included.

Preliminary screening of deformed leprosy cases for surgery was done by the medical officer at the Primary Health Centre (PHC) and also by the Dermatologist/Medical Specialist at district hospital. Those with grade II deformities (Appendix 1) were referred to the District Hospital for further assessment. These screened cases were further referred to the secondary/tertiary institution by providing referral slips.

Inclusion and Exclusion criteria

Only those patients with Grade II deformity who had completed MDT prior to six months and had not experienced any lepra reactions in the past six months were considered eligible. The patients not fulfilling this criteria and who refused surgery were excluded.

The eligible patients underwent preoperative evaluation at the tertiary hospital. All patients were examined by the surgeon and the physiotherapist at the tertiary center. The operating surgeon finally selected the eligible cases as per the inclusion criteria. The patients were then given instruction for preoperative preparation and date for admission. The teams involved in patient care in the tertiary center included plastic surgery, general surgery, anaesthesia and physiotherapy.

On completion of treatment, the patients were discharged along with the necessary postoperative care to their respective PHC/ districts for postoperative care as per the surgeon's instructions. Necessary pressure garments and splints were provided whenever required for individual patients, either at the time of discharge or during the subsequent follow-up visits, which were scheduled 4 to 6 weeks later. The date for the follow-up visit was indicated in the referral slip. All costs (transportation, hospitalization, surgery, postoperative care, medications, splints and dressings) were borne by the state government. If the patient was doing well at the 6-week follow-up appointment, they were refereed back to their PHC and further follow-up was decentralised. Patients who developed complications, if any, were continued to be seen by the plastic surgeons at the tertiary centre.

Outcomes

Primary Outcome: The outcome of the surgeries conducted over the five-day period including any complications was recorded.

Secondary Outcome: As a secondary outcome we looked at the types of deformities present in the cohort of leprosy patients and the commonest deformity prevalent in the patient group. We also looked at the cost of conducting such a camp.

RESULTS

A total of 150 patients with grade 2 deformities were enrolled for the surgical camp in January 2013. Out of these 3 patients refused surgery. A total of 16 patients were unfit to undergo surgery due to co-existing medical conditions. These patients were transferred to the medical wards to address the co-morbid medical conditions.

Primary outcome

Outcome of Surgeries

Claw hand correction: A total of 40 claw hand corrections were performed at the camp. Palmaris longus four tailed (PL4T), Extensor to flexor four-tailed transfer (EF4T- ECRL) and Lasso procedure were the procedures used for claw hand correction at the camp. One patient suffered a superficial wound infection.

***Ulnar nerve release*:** Nine ulnar nerve releases were performed in the camp. Sensorimotor deficit was reduced in 6 out of 9 cases and relief from pain was obtained in all of the 9 cases. The postoperative course was uneventful for 8 out of 9 patients. One patient suffered superficial wound infection.

Flexor digitorum superficialis opponensplasty: Two Superficialis opponensplasties were performed at the camp.

Flap surgeries: Eighteen flap surgeries were performed. They were mainly for neuropathic plantar ulcers. Surgeries included Y-V plasty, advancement flap, fillet toe flap, toe island flap and transposition flap for the coverage of various plantar ulcers. One patient with transposition flap developed superficial necrosis of skin edges that was otherwise inconsequential. Two patients had wound infection that delayed healing.

Split thickness skin grafting (STSG): Seven of the 10 patients undergoing STSG at the camp had 95-100% graft uptake. Two patients had 60-70% graft uptake. One patient had total graft loss.

Lagophthalmos correction: The procedure of choice for lagophthalmos was temporal muscle transfer. It was performed in 12 cases. Median age was 42 years. Three cases were associated with complete ectropion, which had to be corrected before temporal muscle transfer.

[Table/Fig-1] illustrates the surgeries performed in the Leprosy camp and their complication rates at the six-week follow-up period.

The total complication rate in this study was 10.6% (n=11). The procedures not included in this rate are amputation and the total contact cast for clean ulcers, as complete data for these was not available.

Secondary outcomes

The commonest deformity in this cohort was plantar ulceration. [Table/Fig-2] shows the types of grade II deformities, which were present in the patients enrolled.

Expenses: Entire financing comes under the central government funded national leprosy eradication mission. The total cost of the RCS (excluding transportation and patient incentive) was INR 730,000 (£7029.9). This included Rupees One Lac for procurement of equipment like Andersen's Tendon Tunneler, Facia Lata Stripper, Fritschis Spring Retractor, Iris Scissors, Mosquito Right-Angled Clamp, Adsons Forceps.

Patient incentive was INR 3000 for undergoing surgery, and INR 1000 each for attending two subsequent sessions of physiotherapy. (INR: Indian National Rupee).

DISCUSSION

The most common cause of permanent disability in patients with communicable diseases is leprosy. Approximately three million people live with leprosy associated deformity and in the next few decades it's estimated that about a million people will continue to suffer from this disability [7]. In Gujarat, the deformity patients among new cases are still high: 2.51% in 2009-10 to 2.8% in 2014-15 (194 out of 6851 new cases). Hence, even though prevalence of leprosy in reducing the deformity rate among new cases in still high. RCS camps can hence help reduce backlog. The most recent report on DPMR in 2013 reported rise in reconstructive surgery numbers in Gujarat to 138 in 2013 after introduction of RCS camps.

The concept of tertiary hospital based camps for large scale surgeries performed by a team of specialists from different regions or even countries has been implemented successfully in other plastic surgeries like cleft lip repair [8,9]. It was reported that between 2000 and 2012, 260,000 cleft lip and cleft palate repair surgeries were performed successfully in India as a part of the Smile Train project. Out of all the countries in the world where this

Number of complications developed (%)	Number	Type of surgery
1 (2.5%)	40	Claw hand correction (Palmaris longus 4 tailed transfer /lassos procedure)
1 (11.11%)	9	Ulnar nerve release
3 (25%)	12	Lagophthalmos correction
0	2	Flexor digitorumsuperficialisopponensplasty
3 (16.66 %)	18	Flap surgeries
0	1	Flexor tendon release
N/A	9	Amputation
0	4	Debridement of ulcers
3 (3 %)	10	Split Thickness Skin Grafting
0	7	Incision and Drainage
N/A	18	Fixation of Total contact cast for clean ulcers
0	1	Vacuum assisted Device for ulcer treatment

[Table/Fig-1]: Surgeries performed in the Leprosy camp and their complication rates at the six-week follow up period.
N/A: Not Available. All patients did not complete the six-week follow up visit.

Type of deformity	Number (%)
Hand deformity: Claw hand Nerve abscess Median nerve palsy	52 (40%) 40 (30.7%) 9 (6.9%) 3 (2.3%)
Lagothalmos (eye deformity)	12 (9.2%)
Plantar ulcers	67 (51.5%)

[Table/Fig-2]: Types of deformities in the patients enrolled for the camp.

program is run, it was most successfully implemented in India with more than 130 hospitals taking part in this program each year [10]. This is different from an outreach camp setting conducted in rural areas as the surgeries are conducted in a tertiary hospital that has all the requisite infrastructure and manpower necessary for such specialised surgery. The follow-up care pathway is also well organized as the patients are regularly seen by the medical officer in the PHC once they are discharged from the tertiary hospital. These camps also provide training opportunity for surgical residents as well as a database for conducting research and audits to improve service delivery in the public sectors. However, plastic surgical camps for reconstructive leprosy surgery are a novel concept and currently similar events have not been reported in the literature to the best of our knowledge.

Reconstructive surgery is an important part of the national leprosy eradication program. Disability prevention and medical rehabilitation services are given special emphasis in 11th Five Year Plan. 2,570 reconstructive surgeries were performed in India on patients with deformities between 2010-11 [3]. RSC services are to be facilitated and developed further to clear the backlog and to cope up with new deformed cases.

It is important to explain proposed procedure to patient and the advantages and disadvantages of performing the surgery. Coping strategies to live with deformities without causing further injury to the affected parts should be explained to patients who decline or are not suitable for surgery. Pre and postoperative physiotherapy is essential for successful outcome of surgery and therefore an integral part of the RSC process [11].

The commonest nerve to be involved in leprosy is the ulnar nerve [12]. In our patient group as well 30.7% (n=40) claw hand deformities and 6.9% (n=9) ulnar nerve abscesses were found, making it the commonest nerve affected. Leprosy has been the commonest cause of paralysis of the facial nerve in India [13]. Lagopthalmos is the most common presentation of facial nerve paralysis. In our patient group 9.2% (n=12) lagopthalmos deformities were present. Plantar ulceration is the commonest serious disability in leprosy patients [14]. In our patient group this was the commonest deformity with 51.5% (n=67) patients affected. Anaesthesia of the foot is a central factor in the pathogenesis of these ulcers. Unprotected walking (very common in India) also contributes towards the recurrence and chronicity of these ulcers.

LIMITATION

The study does not provide long term follow-up data due to decentralisation of further follow-up care.

CONCLUSION

Leprosy is still a significant cause of deformity and disability in the Indian population. Reconstructive surgery in a camp setup is a low cost alternative of correcting deformity and thereby rehabilitating patients of leprosy into performing occupational and social duties. It provides valuable practical experience in reconstructive surgery to surgical residents. Such tertiary hospital based camps may help reduce waiting lists in public sectors like the NHS. Long-term studies monitoring patients operated in a similar tertiary hospital based camp setting would be worthwhile.

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Hands and feet	
Grade 0	No anaesthesia, no visible deformity or damage
Grade 1	Anaesthesia present, but no visible deformity or damage
Grade 2	Visible deformity or damage present
Eyes	
Grade 0	No eye problem due to leprosy; no evidence of visual loss
Grade 1	Eye problems due to leprosy present, but vision not severely affected as a result (vision: 6/60 or better; can count fingers at 6 metres).
Grade 2	Severe visual impairment (vision worse than 6/60; inability to count fingers at 6 metres); also includes lagophthalmos, iridocyclitis and corneal opacities

[Appendix 1]: WHO grades of leprosy deformity

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