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MODIFIED PEG AND HOLE OSTEOTOMY FOR HALLUX VALGUS

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This is a retrospective study of 101 cases, 16 bilateral, 117 feet of Hallux Valgus (H.V.), treated with modified Peg and Hole Osteotomy. The procedure, as evolved and tried over 10 years with its simplicity and assurance allows onto treat patients of varying age groups as Day Surgery with early ambulation and return to normality. Complications were few and overall satisfactory results were 97%. Thus, it is hoped that this modified Peg and Hole Osteotomy for H.V. will have wide range of application, providing uniform satisfaction to the surgeon and their patient.

HISTORICAL REVIEW :

Kelikian claims Hohmann's double displacement osteotomy for H.V. was made secure by Thomasen's Peg and Hole Technique. An intramedullary wire was used to transfix the osteotomy. Mygind 1952 popularised Thomasen's technique by reporting best results in 100 patients by this method, analysing 535 bunions operated by various techniques. Gibson and Piggott (1962) reported satisfactory results in 128 feet of 86 patients. There were 20% poor or bad results with one non union. Hugh Dovey 1969 reported on 54 patients with 84 feet mostly good results and 1 non union. Turnbull and Grange 1986 compared 20 Kellers arthroplasties and 24 Thomasen's – Mygind Osteotomy recommending the latter. In 1980 at the Ontario Orthopaedic meeting Kumar reported preliminary results in 50 Hallux Valgus (H.V.) and 25 Bunionette- Digitus Quintus Varus (D.Q.V.) treated with modified Mygind Osteotomy. Encouraged with the results, I have adopted the technique to be described for H.V.

MATERIAL :

There were 93 female and 8 male patients operated between 1980 and 1987, with 16 bilateral, there were 117 Peg and Hole Osteotomies performed. Age ranging from 10 to 85 with peaks at 3rd and 5th decades, 75% were between 40 and 70 years of age. Associated surgical procedures were done equally for 56 right and 61 left feet. Maximum number of associated procedures were as expected in the 5th decade. Most common of these were Extensor Hallucis lengthening (E.H.L.), hammertoe correction, removal of Dorsal exostosis and osteotomy for D.Q.V. was next. A total of 119 procedures in 69 feet were recorded. These procedures helped the recovery, only moderately increasing the time. 7 patients with the inflammatory disease make a small group to draw any conclusions. Apart from a patient with Gout needing excision of Dorsal exostosis 4 years later, others seemed to have had satisfactory result.

SURGICAL TECHNIQUE IN DETAIL :

Under general anaesthesia in dry field, curved dorso-medial incision is used to expose the first metatarsal, metatarso-phalangeal joint (MPJ) capsule raising a subcutaneous flap protecting neurovascular structures. Periosteum is incised to expose the neck. A palpable dorsal exostosis may be excised by incising the capsule in the same line and if medial eminence excision is required, careful dissection of the capsule is necessary. Lateral soft tissue release was never attempted for fear of avascular necrosis and not found necessary to achieve desirable correction. Parallel cuts with oscillating saw in the cancellous part at the flare are made 3 mm. or 1/8 of an inch apart. The distal cut is completed from medial to lateral fashioning a square cortical peg dorsally and laterally. Smaller than the peg a hole is made in the cancellous cut surface of head medially and as plantar-wards as necessary. The head is displaced laterally to correct valgus and the round hole is impacted on the square peg. The head is then de-rotated to correct pronation or axial rotation

deformity. Holding the head in corrected position plantar flexing M.P.J. the osteotomy is transfixed with an oblique Kirschner wire. The wire is then turned further, impacting the osteotomy and cut below the dorsal surface and turned laterally on the capsule. The two point fixation secures the osteotomy. Lengthening of E.H.L. is done if necessary and wound is closed in layers. Padded bandage is applied with the toe held in corrected position.

Bonegrafting, using the bone chips has been used since mid 1987 and seems to facillitate healing clinically and radiologically.

The above procedure is carried out as a Day Surgery.

POST OPERATIVE CARE :

Mainly resting, with elevation of feet and ambulating indoors partial weight bearing is advised until the first change of dressing is done in approximately 2 weeks. Active and powerful dorsi-flexion is encouraged from the very beginning. Removal of sutures at first change of dressing is done to use sponge metatarsal pad and 2 inch tensor bandage. At the next attendance in 2 weeks, massage, warm soaks and exercise programme is started 5 minutes, three times a day at home. Near full weight bearing is allowed with a cane and X-ray is repeated in 6 weeks. Normal shoe wear is resumed as soon as the swelling goes down, barring high- heeled shoes. Return to work is in approximately 3 months but earlier and part-time resumption is possible with sedentary work. Oral pain medication is needed for a few days in immediate post- operative period.

The K-wire is removed as a minor procedure under general or local anaesthesia at the patient's convenience when the osteotomy has consolidated.

RESULTS :

Mild to severe H.V. with severe pronation seems to have been treated successfully. Follow up ranges from 6 months to 8 years. Presenting complaints of pain, deformity and inability to wear shoes were relieved universally. Associated procedures for existing deformity helped rehabilitation. Post operative metatarsalgia was not a problem unless pre-existing which was helped especially when other problems were solved. Sometimes, in elderly people, warm soaks and exercises were needed for 6 months or more and soft arch supports were prescribed. For persistent swelling with poor circulation, Parke & Davis below-knee stockings were used. Night splint was used in a few cases for trial when the patient felt recurrence was eminent.

There were 14 complications in all, almost 12% but only 3 unsatisfactory outcome of 117 feet operated.

Occasionally, the K-wire turned medially needing earlier removal and in one case, pain from joint irritation was relieved upon removal. One non union healed satisfactorily with compression screw fixation. In one lady's right foot which was more painful than deformed left H.V., Hallux Rigidus developed in 8 years after surgery requiring fusion. Excision of dorsal exostosis was necessary in 5 out of 6 patients, one refused surgery and lost to follow up. There were no infections.

DISCUSSION :

Loss of corrected position even requiring manipulation and re- operation (Gibson and Piggott) and others assessing Chevron and Mitchell Osteotomy claim to be the main problem with metatarsal osteotomy for H.V. Two point fixation securing the correct position of osteotomy thus solves many problems. Apparent shortening by 3 mm. perhaps in corrected position may represent real lengthening. Advantages could be summarised. Bilateral simultaneous procedures are not recommended. There was one each, a male and a female patient in this series. Although credibility increases with the example of mother undergoing surgery for H.V. after her son's met. varus is corrected, it does not throw light on etiology.

Pedo-barograph, gait analysis and 10-15 years clinical and radiological follow up will answer other questions regarding the limits of this procedure and its effectiveness against the presence of degenerative changes, subluxation and gross deformity.

Contraindications remain as one can imagine local sepsis, neuropathic joints, previous surgeries (not a proven salvage procedure) and if general

expectations are poor with age and infirmity.

A 300 lb. lady with severe deformity and phlebitis has done well with early ambulation. She is looking for volunteers for other H.V. operation.

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ANKLE-FOOT PROSTHESIS INCORPORATING THE ARTICULATED BONY SKELETON OF A SURGICALLY AMPUTATED LIMB

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To simulate the functions of the living foot, mechanisms are provided in an ankle-foot prosthesis to allow bi-planar or tri- planar movements (1). However, material and methodology constraints in fabrication technology limit the extent to which structural and functional replication can be achieved. The Jaipur Foot (2) is an exception because it is hand-made and is capable of being modified readily during fabriction.

We report here an ankle foot prosthesis incorporating the intact articulated bony skeleton of a surgically amputated limb as an endoskeleton (Figure). We substituted the core rubber blocks of the Jaipur Foot with the entire foot endoskeleton, while retaining the reinforced rubber shell of the foot. Three such prostheses were prepared using formalin fixed bony skeletons from limbs amputated for vascular insufficiency. The feet were dissected free of soft tissue down to the capsules and ligaments, dried and painted with vulcanising cement, and covered with unvulcanised rubber compound, after which they were incorporated in the shell of Jaipur Foot (3, 4). The prostheses proved satisfactory on bench-testing (4) for load deflection and limited fatigue studies under simulated conditions. They could not be tested on the patients themselves. One patient had hemiplegia on the unamputated side, another was unwilling to bear weight on the stump because of stump pain and the third was lost to follow up. A volunteer amputee, however, has found them satisfactory.

Earlier, we had demonstrated the feasibility of such prostheses prepared using exhumed or cadaveric bones (3, 4). These prostheses were bench tested, subjected to prolonged, simulated fatigue and field tested on a volunteer amputee. Radiological studies revealed that movements occurred at the various joints on loading, and that the joints were restored to a neutral position on unloading the foot. The prostheses were well received by the amputee. However, exhumed bones showed multiple fractures after prolonged use while formalin fixed cadaveric bones remained intact after similar testing.

Such encouraging results were tempered by the fact that both cadaveric bones and exhumed bones are difficult to obtain. We therefore undertook the present study to prepare ankle foot prostheses of bones harvested from surgically amputated limbs. Surgically amputated feet appear to hold potential for use as an endoskeleton in ankle foot prostheses. We have no reason to believe that they will not be as durable or versatile as formalin-fixed cadaveric bones while remaining a viable alternative to available prostheses. We further believe that, among the currently available prostheses, the bony endoskeleton prosthesis most closely matches the normal foot functionally. Additionally, if a patient's amputated foot were to be used to fashion his own prosthesis and with his full knowledge, the ensuing psychological benefits could be immense.

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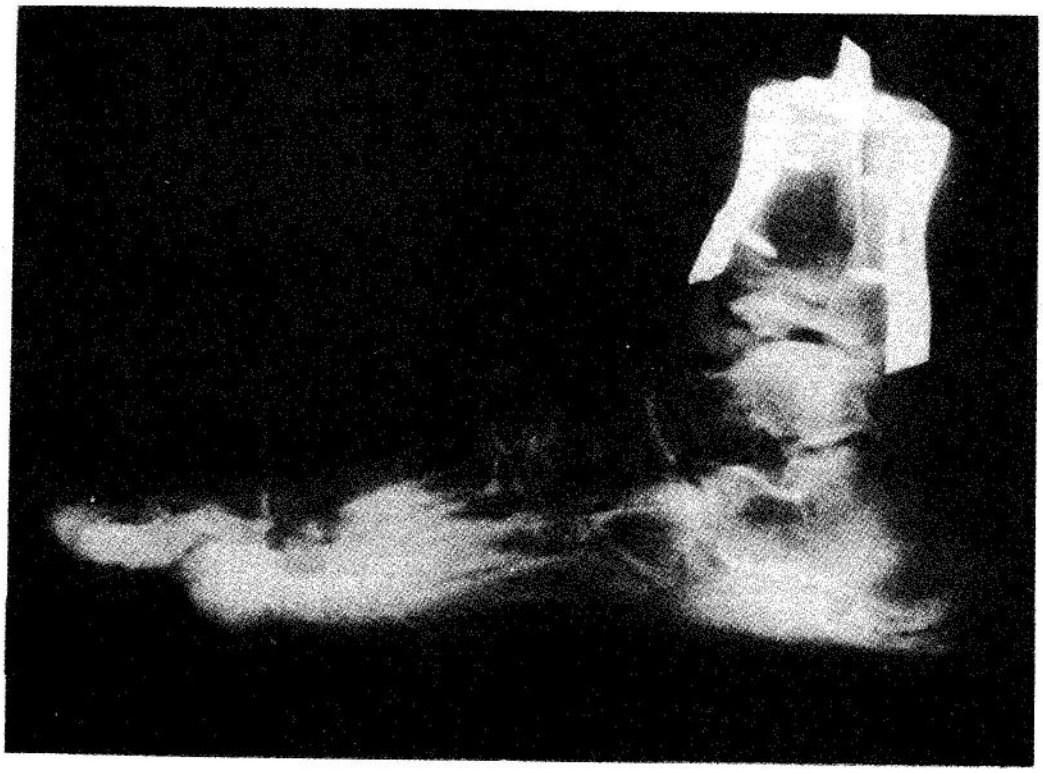
LEGEND FOR FIGURE

Lateral radiograph of an ankle-foot prosthesis prepared with incorporation of bony endoskeleton obtained from a formalin fixed surgically amputated limb. All the bony articulations are well preserved inside a fibre-cord reinforced rubber shell. The carriage bolt is attached to tibia and fibula by means of screws passing through a 'U' shaped metallic extension from the base of the bolt.



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AUTO INJECTION OF PAPAVERINE FOR ERECTILE DYSFUNCTION FOLLOWING SPINAL CORD INJURY

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Erectile dysfunction is a common complication in men following spinal cord injury (SCI). This leads to failure to achieve satisfactory sexual intercourse. Intracavernous injection (ICI) of vasoactive drugs is the modern choice of treatment. Auto injection programme (self injection) of ICI of papaverine HCL of 26 young traumatic paraplegics were studied for a duration of 3 years. Thirty patients were selected for auto injection, but 26 patients entered the auto injection programme. Their mean age was 30 years (range 24-38 yrs.), average dose for full erection was 15 mg. (range 9-60 mg.) and mean duration of erection was 30 minutes (range 15-180 minutes). None had priapism after entering the auto injection programme. Echymosis and/or haematoma requiring no treatment was the only complication noticed. Selected young paraplegics are highly successful with auto injection programme. Priapism occurs only while titrating for appropriate dose. Papaverine is considerably safer and more suitable for developing and under developed countries in treating the erectile problems of SCIED men.

Irreversible spinal cord injury is usually followed by tetraplegia or paraplegia and loss of normal bowel, bladder and sexual function.[1] Men with spinal injuries seek help from experts on sex and reproduction chiefly for three problems.

1) to improve the quality of (especially) the duration of their erections so they can coitus for pleasure.
2) to obtain semen.
3) to improve the quality of the semen.[2]

Options to overcome erectile impairment include alternative sexual practices, vacuum tumescence devices, penile prostheses and more recently, the use of intracavernous injections of vasoactive medications3. Studies have examined the use of intracavernous injection 4, 5, 6, 7, 8, 9, 10, vacuum tumescence devices 11, 12, 13, penile prostheses 14, 15, oral medication16, and topical drugs17, 18.

This prospective study focuses on auto-injection of papaverine HCL in young traumatic paraplegics and evaluates the merits and demerits for use in both developing and under-developed countries.

MATERIAL AND METHODS

Thirty traumatic SCIED paraplegic men from the Rehabilitation Ward and Outpatient Clinic, who fulfilled the following selection criteria, were offered the auto-injection programme.

Selection criteria

Paraplegics of age group 20-40 years, (having erectile dysfunction), who have successfully reintegrated in the society with no preventable pressure sores for at least six months.

Informed consent was obtained from the patients after fully explaining the complications of papaverine ICI. Following that, the patient is titrated for appropriate dose. The dosage regime for titration was as follows :- 9 mg., 15 mg., 30 mg. and 45 mg. and 60 mg. The desired duration of erection was left to the choice of the patient but not exceeding 4 hours. It was explained that papaverine does not have a linear dose related response on the duration of erection.

Once the appropriate dose is known, the patient is taught self ICI (one session of 15 minutes with audio visual aids).

The patient was provided with three months' supply of papaverine multidose vial, 2.5 ml.

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syringes, 25 gauge needles and alcohol swabs and reviewed every three months in the Rehabilitation OPD Clinic. The interval between injury and inclusion in the programme averaged 3.5 years (range 6 months to 5 years).

RESULTS

Among the 30 selected paraplegics, 4 were dropped before entering the programme because their partners objected to the procedure. Twenty-six patients entered the auto injection of ICI of papaverine HCL. Of these 1 (4%) developed priapism while titrating for the dose. None of the patients had priapism after entering the programme. Satisfactory erection achieved within one to three minutes following the ICI (average 1 minute). Mean duration of erection lasted was 30 minutes (range 15 minutes - 180 minutes). The dosage received was 9 mg. to 60 mg. (average 15 mg.).

Fifteen (58%) of the patients had echymosis and/or haematoma which required no treatment. There was no fibrosis or scarring of the cavernous tissue.

After entering the programme, 7 out of 8 single marital status paraplegics got married. The patient's satisfaction level was as follows :–

	Satisfaction level	Percentage
Overall	satisfied	100%
Penile Regidity	satisfied	63%
	disatisfied	37%
Duration	satisfied	90%
	disatisfied	10%

DISCUSSION

Auto-injection of vasoactive medications have gained great popularity since Virage first reported their use in the erectile dysfunction in 1982[19]. Papaverine is a smooth muscle relaxant that causes vasodilation. It's exact mechanism of action is unknown.

PGE1, is claimed to be superior than papaverine because more physiological, erection is linearly dosage related and incidence of priapism is less. But PGE1, or the combination drugs, have short expiry periods and require refrigeration. Moreover, the patient needs to visit the hospital which practices the above programme more frequently to obtain the drug as it requires mixing up.

All of our patients kept their multidosage vial, syringe and needle in the bath room. Keeping the medicine in the refrigerator, which is located in the kitchen in almost all houses, according to our patients seems more embarrassing and also they lose their privacy in the joint family environment.

CONCLUSION

To conclude, carefully selected SCIED patients and very low starting dosage for titration (9 mg.) definitely reduced the complications of papaverine to an acceptable level.

The requirements of refrigeration, frequent attendance to the hospitals which provide the above programme for supply of vaso active drugs such as PGE1, or combination drugs, outnumber the superiority of these drugs to papaverine HCL in developing and under-developed countries.

Therefore, papaverine HCL ICI is still a safer drug of choice for erectile dysfunction of SCIED patients.

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SUPRACONDYLAR OSTEOTOMY FOR CORRECTION OF POST POLIO DEFORMITY AT KNEE JOINT

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Supracondylar osteotomy for fixed flexion deformity is a reliable procedure. Up to 30° of deformity it can be done directly. For severe deformities it is always better to perform Yount's soft tissue release first with two pin skeletal traction and passive stretching. This skeletal traction can be continued till no more correction by traction is expected i.e. the deformity becomes static. This is the time when supracondylar osteotomy should be performed. This reduces chances of complications and yields good results.

Supracondylar osteotomy was performed in 22 such patients, 3 cases being bilateral. Superacondylar osteotomy as second stage procedure showed good results with minimum complications.

Out of many post Polio deformities at knee joint, fixed flexion deformity is most commonly encountered in day to day clinical practice. Most of the patients having this deformity walks with the help of unilateral or bilateral axillary crutches. Many bilaterally and severaly affected patients cannot walk at all. Gait pattern of such patients can be significantly improved by doing surgical correction of deformity.

Imbalance of muscle power of extensors and flexors of knee and weak extensors of the hip contribute in development of fixed flexion deformity at knee joint.

MATERIAL AND METHOD

Between June, 1990 to Feb., 1993, supracondylar osteotomy of femur was done in 22 patients for correction of fixed flexion deformity at knee joint, 3 being bilateral.

In 16 cases Yount's soft tissue release was performed initially followed by two pin skeletal traction. In one case skin traction was applied. Superacondylar osteotomy was performed as second stage procedure.

In 8 cases supracondylar osteotomy was performed directly.

OPERATION

Under tourniquet control one long incision was given from left lateral condyl of femur exposing anterolateral surface of femur.

Periosteum was incised exposing the bone at metaphysio-epiphyseal junction. Osteotomy was done at metaphysio-epiphyseal junction or as low as possible, taking out the wedge keeping the base anteriorly. Size of the wedge depends upon the degree of flexion contracutre. The limb was straightened, rotational deformity if any was corrected. Wound was sutured in layers. Groin to toe cast was applied to immobilise the osteotomy site. Post operative check X-Ray was done. Stitches were removed on 10th day and G.T. cast was reapplied. Patient was instructed not to bear weight on operated extremity. In follow up plaster cast was removed. Osteotomy site was examined carefully for any abnormal mobility in side to side and anteroposterior plane.

Sound union at Osteotomy site was confirmed by check X-Ray.

OBSERVATIONS

Age of the patients varied from 12 to 35 years. Fixed flexion deformity at Knee ranged from 15° to 35° before supracondylar osteotomy.

When the deformity at knee joint was very severe ranging from 15° to 90°, then fixed flexion deformity was also present at hip which was treated by Soutter's soft tissue release.

Major part of fixed flexion deformity at knee

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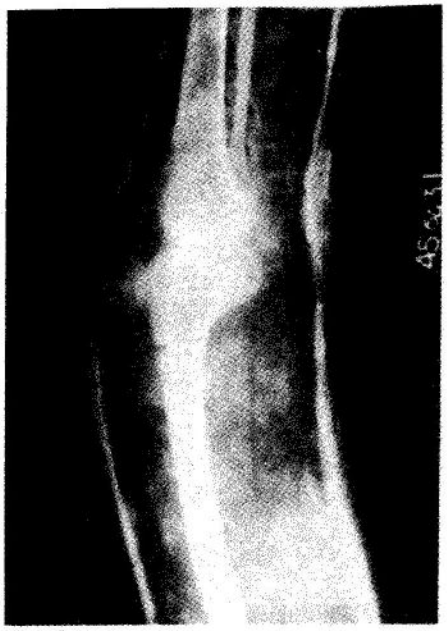
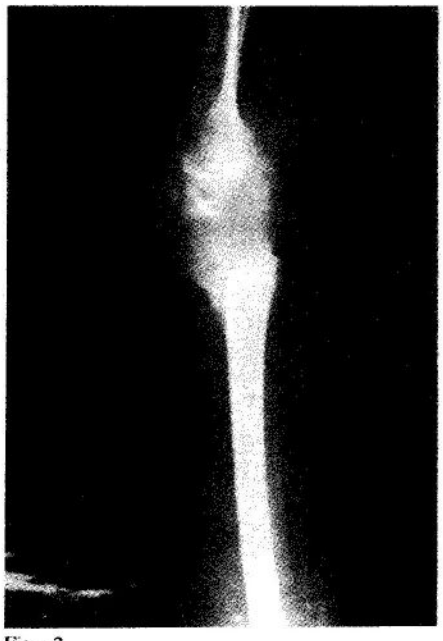
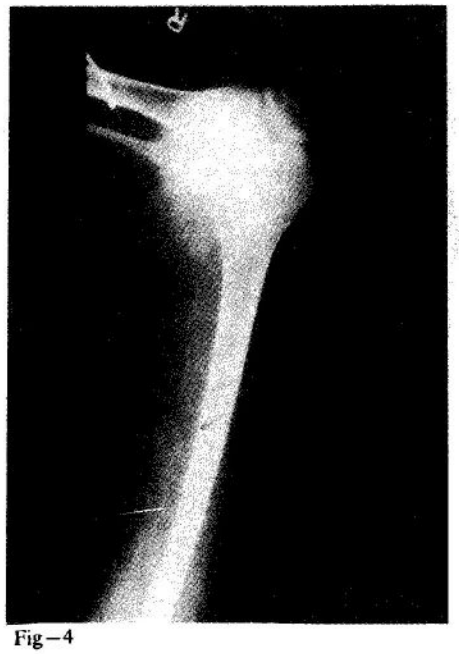


Fig–1

Fig–2



Fig–3



Fig–4

Fig–1 : Pre-operative X-ray showing flexion contracture at knee, osteoporosis and muscle wasting.

Fig–2 : X-ray lower 1/3 of femur including knee joint lateral view showing ideal level of osteotomy. Bony ends are in well united correct position. Narrowing of joint space can be seen.

Fig–3 : X-ray of lower 1/3 of femur including knee joint AP view of same case in Fig–2 shows correct level of osteotomy.

Fig–4 : X-ray of lower 1/3 of femur including knee joint posterior cortex was kept intact here.

joint was corrected by Yount's soft tissue release followed by two pin skeletal traction. In most of the cases it was continued for at least one month. Remaining part of deformity was corrected by supracondylar osteotomy.

Patellectomy was done in one case as patella was laterally placed. Plantar fasciotomy was done in two cases. Hamstring tenotomy was done in 4 cases. First follow up was done after 2- 1/2 months of operation. Second follow up was done after 3 months of first follow up.

COMPLICATIONS

Only few cases showed complications :-

1. Infections– only one case developed infection which was treated by broad spectrum antibiotics.

2. Delayed union or malunion– only few cases developed delayed union. In such cases period of immobilisation was extended for 2 months more.

3. Knee joint stiffness– Severe restriction of movements was observed in two cases.

4. Pain– patients were not having any pain after surgery. 8 cases complained of mild & one case complained of moderate pain.

5. Shortening– All cases showed some shortening– 22 cases showed shortening upto 1/2". 2 cases showed shortening upto 1". One case showed shortening of 2".

DISCUSSION

Various surgical procedures have been used to correct fixed flexion deformity. Hamstring tenotomy and manipulation under G.A. were used initially.

Yount's in 1926 favoured division and excision of Iliotibial band and lateral intermuscular septum.

Wilson in 1929 recommended posterior capsulotomy of knee joint which was later criticised as it resulted in posterior subluxation and gross limitation of movements and pain.

Huckstep in 1975 favoured serial manipulation, Russel traction and calipers. Leong et al in 1982 performed supracondylar osteotomy in 82 patients and showed good results.

Baveja, S and Sharma, J.C. (1986) performed supracondylar femoral osteotomy in 39 cases of flexion contractures of knee due to poliomyelitis and guinea worm infection, as single stage procedure and acheived good results.

Present series although small in number shows good results in comparison to previous two workers (Table No. I) in terms of postoperative pain and infection and lesser number of cases having persistent deformity after supracondylar osteotomy.

In view of observations of earlier workers and comparing it with present series it is clear that supracondylar osteotomy if carried out in severe fixed flexion deformity of knee (more than 30°) carries increased risk of all types of complications including pain at knee, shortening of extremity, delayed union, malunion and even persistent deformity.

Additional procedures if required can be done simultaneously and duration of hospital stay can be reduced.

Only two cases were having 5° of fixed flexion deformity even after supracondylar osteotomy.

TABLE NO. 1

COMPARISON OF RESULTS OF SUPRACONDYLAR OSTEOTOMY WITH RESULTS OF PREVIOUS TWO WORKERS.

	Leong et al	S. Baveja Prof. J.C. Sharma	Present series
Number of Osteotomies	89	39	25
Number of patients	82	35	22
Age in years.	8 to 25	4 to 35	12 to 35
Degree of contractures	15 to 95	20 to 100	15 to 90
Residual deformity	15 to 95	2	5° in two cases
Infection	12	04	01
Pain	06	02	01

This minor deformity is acceptable since it can be accomodated in caliper.

Only four cases showed delayed union which were treated by extending period of immobilisation for one month more.

Most of the patients acheived good range of knee flexion with in three months. Only in two cases severe restriction of knee flexion was seen.

RESULTS

Significant improvement was seen in gait pattern of patients after surgery which made them more acceptable in society. Some patients showed dramatic improvement in their day to day activities.

Four patients were using bilateral axillary crutches before surgery. Only one could discard both the crutches remaining while three could discard only one crutch.

Ten patients were using only one axillary crutch before surgery. All of them could discard crutch and could walk with the help of caliper only.

Seven patients were walking with hand on thigh gait. Six could manage to walk with HKAFO and one with KAFO without crutches or cane after surgery.

One patient who was bedridden before surgery, could walk with caliper and one crutch. Three patients were bilaterally affected and were operated. Only one could discard both the crutches and walked with the help of calipers only. Remaining two used bilateral long calipers.

Pain and stiff knee was the commonest complaints made by patients after surgery. Adequate knee flexion was acheived with in two to three months after removal of cast.

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ADAPTIVE SHORTENING OF LONG FLEXORS IN PARALYTIC CLAW HANDS

BY

DR. G.A. ANDERSON

Between the years 1983 and 1991, 87 paralytic claw hands out of 252 displayed adaptive shortening of their extrinsic flexors. This was identified by assessing the adaptive shortening angle. Moderate and severe adaptive contracture was found in 86.4% of hand. Supervised physiotherapy preceeded reconstructive surgery. Follow up assessment showed no adaptive shortening. This secondary problem in paralytic claw hands can be prevented if home self-care exercises are introduced early.

INTRODUCTION :

Partial paralysis of the ulnar nerve with or without an associated partial median neuropathy does not pose too great a problem for an individual to cope with the routine demands of daily living. But an established and completely paralysed nerve does incapacitate a person to a considerable degree. It is reported that the grip strength of the hand following distal ulnar and median nerve palsy can be decreased as much as 60% to 80% when compared to the normal side (Mannerfelt 1966, Brown 1970). It is easy to understand why, this is so. For, the weakness following nerve paralysis completely wastes away the intrinsic muscles. And we are aware that the strength of a muscle is related to its effective cross sectional area, whereas the excursion of a muscle is proportionate to the length of its fibres. Therefore a workman with intrinsic paralysis may be seriously handicapped.

The hand deprived of intrinsic muscle power is left solely under the control of the long flexors and extensors. This results in an unstable system (Landsmeer 1961), because the increased extending force moment at the metacarpophalangeal (MCP) joint will give rise to the characteristic claw deformity, namely : MCP joint hyperextension and proximal interphalangeal (PIP) joint flexion. The principal disability in this deformity is the lack of MCP joint and PIP joint independance. The PIP joint continues to adopt a state of flexion, whether the MCP joint is flexed or extended. The PIP joint never gets to fully extend. As a result the structures on the volar aspect of this joint remain lax and secondary changes of an adaptive nature develop in the skin, fascia, tendon or capsule. Further there is a selective worsening of the problem related to the superficialis muscletendon unit when an individual acquires the habit of flexing the wrist to obtain some opening of the fingers to grasp large objects. Here he makes use of the tenodesis effect of the extensors to open the fingers i.e., to extend the interphalangeal joint but, the long flexors mainly, the superficialis gets dysfunctioned to a variable degree. Myostatic contracture, which is the fibrotic change of the supporting connecting tissue of a muscle gradually develops.

In the past, treatment which was directed towards removal of joint contracture in claw hands diminished to some extent this secondary problem of adaptive shortening of long flexors. But, the isolated presence of adaptive shortening (contracture) of long flexors in claw hands had never been specifically looked into.

Material and Methods :

During a period of 9 years, from 1983 to 1991, there were 252 established paralytic claw hands

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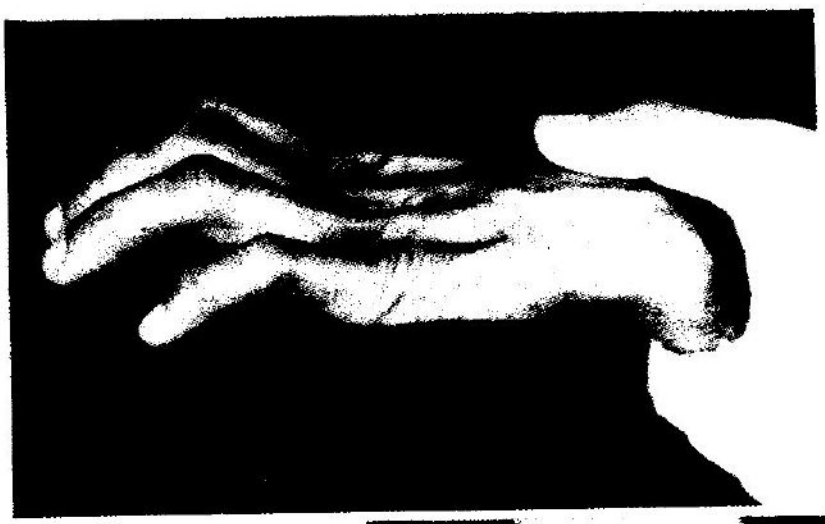

Paralytic Claw Hand showing MCP joint extension and interphalangeal joint flexion.

Paralytic Claw Hand stabilised at the MCP joint showing that the flexion of the interphalangeal joint can be passively corrected.

With the wrist joint dorsiflexed the PIP joint flexion deformity is revealed, characteristic of superficialis tendon adaptive contracture.

that had reconstructive surgery. Out of this number, 87 claw hands manifested long flexor contracture as a secondary problem, 74 had skin, capsular and long flexor contracture and the remaining 91 claw hands were either supple and mobile or hypermobile. The aetiology was Hansen's neuropathy in 223 cases and post traumatic nerve plasy in 29.

In C.M.C. Hospital, Vellore a new protocol for managing paralytic claw hands was introduced from 1982. The reconstructive surgical method chosen varied with the 'Hand Type'. The association of secondary problems in these hands besides age, occupation and duration of deformity were the important parameters for the physiotherapist and surgeon to select an approriate insertion site and motor to correct the deformities.

Assessment :

In the 87 paralytic claw hands with long flexor contracture the adaptive shortening angle was measured.

The adaptive shortening angle is that angle measured at the PIP joint with the wrist kept in neutral position, in 30 degrees extension and 60 degrees dorsiflexion position. The presence of the long flexor contracture (principally the superficialis) was thus verified if the PIP joint kept extended passively began instead to flex as the wrist was extended beyond neutral (Fig. 1, 2 & 3).

The author's grading System was followed :

Mild Adaptive Contracture : PIP joint flexion deformity seen only when the wrist is held at 60° extension.

Moderate Adaptive Contracture : PIP joint flexion deformity seen only when the wrist is held at 30° extension.

Severe Adaptive Contracture : PIP joint flexion deformity seen even when the wrist is held at or just above the neutral position.

According to the author's grading there was mild, moderate and severe superficialis tendon contracture in different percentage; moderate being the largest. (Table 1).

Physiotherapy :

Wax bath and oil massage preceeded gentle passive stretching exercises for all fingers. In addition to this, muscle strengthening exercises and isolation exercises were taught to the patient. Exercises are specially directed towards maintaining straight interphalangeal joints while gently extending the wrist. After a 20 minute period of exercises, a well padded volar POP slab is applied extending from 2" distal to the cubital crease upto the finger tips. Twice a week the angles are recorded on the angle measurement graph. Exercises and splinting are continued until no further improvement in the angles are seen for a whole week. This would show a plateau on the graph. Great care is taken to avoid forcing the pace of exercises so that joint swelling or palmar redness does not develop. Functional assessment at the occupation therapy unit, is done before commencing physiothrapy and thereafter on a weekly basis. At the point when grip strength shows any early signs of deterioration when compared to the first assessment, then physiotherapy measures are stopped. It is after this stage that the patient is admitted for reconstructive surgery.

TABLE – 1

Pre-physiotherapy and Post-operative Adaptive Shortening Angle Grades.

*Grade	Pre-Physiotherapy Stage N : 87	Post-Operative Stage N : 87
Mild	12 (13.8%)	18 (20.7%)
Moderate	51 (58.6%)	64 (73.6%)
Severe	24 (27.8%)	3 (3.4%)

*Refer to Author's grading in the text.

Results :

Supervised hand physiotherapy done judiciously and with a specific objective for these hands showed a reduction in the angles of the severe adaptive contracture group by 24.4%, 21 hands shifted to a moderate grade. Six hand in the moderate group attained a mild grade. The total absence of adaptive contracture i.e., no PIP joint angle with the wrist above 60° dorsiflexion was never achieved in any hand (Table 1).

In the 64 claw hands showing only moderate adaptive contracutre of the superficialis an Extended Pulley Insertion (modified Zoncolli Lasso) using either the F.D.S.R. or F.D.S.M. as the motor, was performed. The combined excellent and good results was a little over 90% as assessed by the method of percentage correction of pre-operative unassisted angles at the PIP joint, as proposed by Brandsma and Watson (1982). In the hands showing mild adaptive shortening, 11 had the Palmaris Longus Four Tail operation (PL4T). In the 3 hands with severe adaptive contracture the procedure done was intrinsic replacement using a single superficialis (modified Littler's modification of Stiles-Bunnell operation) and 7 underwent Brand's Extensor-Flexor Four Tail procedure (EF4T). The Extended Pulley insertion using a superficialis as motor (the subject of another communication) resulted in the MCP joint obtaining a position 10° short of neutral as is intended. This does not permit for any hyperextension. However no finger of any hand showed adaptive contracture of other superficialis at the minimum 2 year follow up period.

Discussion :

Any state of prolonged resistance to passive stretching in a muscle may be considered as a contracture. Physiological contracture of any muscle, results from mechanical or chemical causes acting directly on the contracted mechanism without involving an action potential. Myostatic contracture is a fibrotic condition of the supporting connective tissue of the muscle or joint, resulting from immobilization of the muscle in a short position while the innervation remains intact. Brand (1985) has described the tendon as acquiring Drag and resistance to movement if they remain in any degree of disuse. In paralytic claw hands the extrinsic flexors mainly the superficialis, is at a disadvantage since they are not used to their full potential and they are not stretched to their total amplitude. When a range of motion is not used it will be gradually lost. Eventually para articular structural changes overshadow the primary deformity. Long duration of deformity in the hands of patients also having glove type of sensory deficit and who are not given the benefits of simple physiotherapeutic measures in time are likely to develop these problems (Anderson 1984). Patients with paralysis due to Hansen's neuropathy are more susceptible to these adverse changes then those with paralysis following nerve injuries. In this study the occupation of the patients were mostly as farmers or casual labourers. The insiduous onset and progress of Hansen's neuropathy in these social groups are more likely to go unnoticed by the sufferers themselves. It is therefore necessary for centres carrying out Leprosy eradication programmes and rehabilitation projects to direct their efforts of deformity prevention to this vulnerable group as well.

Grading of adaptive shortening of long flexors are an essential step in assessment and record keeping. It enables the team to identify the patients hands which deserve special attention and perhaps prolonged physical therapy.

Simple physical therapy such as oil massage and passive stretching exercises of weak and deformed hands at the outset of treatment or when a patient develops intrinsic muscle weakness while under medical treatment, can be instituted and imparted to the patient themselves. They can perform these as home self-care exercises. This is a totally inexpensive proposition which is likely to be cost effective in the long run when surgical or vocational rehabilitation are carried out.

Physical theapy plays a vital role to reduce long flexor contracture so that optimal results are obtained from reconstructive surgery. The simplicity of physical measures in paralytic claw hands cannot be more simpler. It is actually a demand on the therapist's patience rather than his/her skill. Any signs of weakness in the grip strength during the course of pre- operative physiotherapy should warn the therapist and surgeon not to persist with physical measures. A

weak hand cannot be re- educated well in the post-operative period, stiffness will undoubtedly thwart the efforts of the surgeon and the patient will be the ultimate looser. It negates the very purpose of physiotherapy goals.

Prevention of long flexor contracture making sure that hands are supple and mobile and in turn serviceable with minimal need for substitution patterns of hand function at home and at work would help the deformed NOT to become disabled.

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Captions for Figures 1, 2 and 3 (Photographs)

Figure—1 :

Paralytic Claw Hand showing MCP joint extension and interphalangeal joint flexion.

Figure—2 :

Paralytic Claw Hand stabilised at the MCP joint showing that the flexion of the interphalangeal joint can be passively corrected.

Figure—3 :

With the wrist joint dorsiflexed the PIP joint flexion deformity is revealed, characteristic of superficialis tendon adaptive contracture.

COMMUNITY BASED AND INTEGRATED REHABILITATION OF LEPROSY PATIENTS

GANAPATI R.*, ATUL SHAH**, NEELA SHAH***, KINGSLEY S.**** AND MITTAL B.N.*****

Currently the term "Community Based Rehabilitation" (CBR) of the handicapped persons is used more frequently. If the WHO definition is interpreted properly, it will be clear that the terminology implies that any attempt at rehabilitation should indeed be a community based one, and the patient needing any form of support should not be placed in an "artificial" situation exclusively meant for any particular disease or disability receiving help by way of charity. Moreover, treatment of physical disability is a definite prerequisite.

The phenomenon over the years has created a situation in which it has become very difficult to think of "integrated rehabilitation", which even in the case of the handicapped, as practised in general is not truly integrated. "Community based and integrated rehabilitation", therefore, when applied to the field of leprosy seems indeed a distant dream. However, it must be stated that some noteworthy attempts in this direction are now being made particularly in the Indian context.

The authors present one such attempt which stems out of the assumptions which we have made as a result of our observations over the years.

ASSUMPTIONS :

1. 'Stigma' peculiar to leprosy militates against true rehabilitation concept and arises because of deep rooted belief that the disease causes the deformities. The need for leprosy rehabilitation to a large extent therefore arises as a result of neglected care of disabilities at various stages for which an effective technology is not yet available.
2. Care of the disabled leprosy patients especially in rural areas is virtually non-existent as a field based programme because whatever technology available is institution or hospital based.
3. If at all any care is available to a few patients at the community, it reaches them only in a patchy manner, through some voluntary organizations and not by the government sector which dominates about 80% of the National Leprosy Eradication Programme (NLEP).
4. Attempts at integration are not made particularly by voluntary organizations in offering rehabilitation services even in areas where there is a scope for such integrated services.

STUDIES BASED ON ASSUMPTIONS :

Keeping in view the above assumptions, we studied the problem of rehabilitation mainly with reference to hand disabilities in leprosy. This is because, as compared to lower limb deformities, hand disabilities form a major handicap and seriously affect the patient's performance in domestic and occupational situations. The following is an account of how the above assumptions were studied under field conditions.

ASSUMPTION NO. 1 :

Care of the hands and protection from injuries resulting from the sensory changes is relatively easy to communicate to the patient and manage. However, motor disabilities which lead to visible damage are more difficult to manage. The technology which we evolved, after years of

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Table 1 : Physical Aids in relation to hand disability.

	Disability		Technology
1.	Inability to adduct little finger.	:	Adductor Band*
2.	Mobile claw hand	:	Finger loop Splint*/Gutter splint*
3.	Claw hand with contractures but no bony block.	:	Gutter Splint*
4.	Adduction deformity of the thumb ('Ape' thumb deformity)	:	Opponenns Splint*
5.	Operable hand deformity	:	Camp-Surgery**
6.	Inoperable fixed contractures of fingers & mutilated hand.	:	Grip Aid +

*Atul Shah et al (1988), Atul Shah (1991, 1992), **Atul Shah (1983), + Ganapati et al (1983), + Yawalkar et al (1992).
The above adaptations were extensively field tested in urban slums before extension to rural situations. (Ganapati and Kingsley, 1991).

experimentation in relation to each type of motor disability is shown in table No. 1.

ASSUMPTION NO. 2 :

As the services should necessarily be field-based, operational research was undertaken in a Taluka in Gujarat consisting of about 785 leprosy patients with 408 deformed patients (Atul Shah & Ganapati, 1992) and extended to two districts in Andhra Pradesh where deformed population alone was to the tune of over 3000. The field programme is also now implemented in the whole of Goa state.

The following shows the magnitude of the problem of leprosy handicap in some of the areas where disability care services are offered through projects operating under the advice of the authors.

Till May 1993, (1) 908 articles used for the activities of daily living such as spoon, tumbler, mug, tooth brush, razor, comb and walking stick, (2) 89 handles of tools and instruments like sickle, hammer, planer, scissors, knife, painting brush, pick axe, pocker, screw driver, spanner, 'Ambar' charka, tri-cycle, patter, farsan and soldering iron used for various occupations, and (3) 15 utensils

Table No. 2 : Magnitude of disability problem.

Sr. No.	Area	Population	No. of regd lep. cases	No. of def. lep. cases	% among pop.	% among lep. pts.
1.	Borsad (Gujarat)	3,71,170	932	408	0.50	21.1
2.	Prakasam (AP)	23,29,571	18,789	702	0.07	9.0
3.	Kurrnool (AP)	29,73,709	28,484	1,496	0.05	5.2
4.	Goa	11,68,622	5,246	185	0.01	3.5

ASSUMPTION NO. 3 :

It was essential to operate the programme at the community level through the vast government staff comprising of para medical auxiliaries, supervisors, physiotherapy technicians, medical officers and District Leprosy Officers. An intensive training based on the above novel technology to all categories of staff was undertaken through field visits and demonstrations.

Table 3 : Training of Personnel.

Sr. No.	Area	Designation	No. of trainees
1.	Bombay City	– Medical Officer	7
		– Non Medical Supervisor	8
		– Para Medical Worker	36
		– Physiotherapy Technician.	10
2.	Borsad Taluka, Gujarat	– Leprosy Supervisor	2
		– Leprosy Assistant.	7
3.	Prakasam District Andhra Pradesh	– Medical Officer	5
		– Non Medical Supervisor	24
		– Non Medical Assistant	111
		– Physiotherapy Technician	5
		– Health Educator.	2
4.	Kurnool District Andhra Pradesh	– Medical Officer	7
		– Non Medical Supervisor	23
		– Para Medical Worker	118
		– Physiotherapy Technician	4
		– Health Educator.	2
5.	Goa State	– Non Medical Supervisor	4
		– Paramedical Worker.	25

The resultant gain in knowledge led them to take keen interest in disability care, thereby change the overall pattern of leprosy care from mere drug delivery to one of disability care delivery along with drugs, thereby increasing the scope of community based rehabilitation.

The following tables show the result of usage of the above adaptations as administered essentially by the government employees.

Table No. 4 : Centres selected for prefabricated standardised splints.

Sr. No.	Centres		No. of Patients
1.	Bombay City & Suburban Slums	:	948
2.	Borsad Taluka, Gujarat	:	99
3.	Baroda District, Gujarat	:	16
4.	Raipur District, Madhya Pradesh	:	140
5.	Prakasam District, Andhra Pradesh	:	698
6.	Kurnool District, Andhra Pradesh	:	954
7.	Goa State	:	20
Total No. of patients provided splints		:	2875

Table No. 5 : Follow-up and results.

No. of patients provided splints	:			2875	
No. of patients followed up	:			2016 (70%)	
No. of patients reporting improvement	:			1175 (88%)	
Usage	No. of patients	%	Improvement	No. of patients	%
Regular	945	47	Marked	420	21
Irregular	705	35	Moderate	585	29
Not using	190	9	Minimum	648	32
Lost	176	9	Nil	363	18

Table No. 6 : Grip aids* provided to leprosy patients :

Sr. No.	Centres		No. of Patients	No. of Grip-aids
1.	Bombay city & Suburban slums	:	84	180
2.	Borsad Taluka, Gujarat	:	49	83
3.	Prakasam District, Andhra Pradesh	:	248	377
4.	Kurnool District, Andhra Pradesh	:	198	250
5.	Goa State	:	11	27
6.	Leprosy Hospitals & organized colonies	:	64	95
	TOTAL	:	654	1012

(* Grip aids made from Modulan (R) epoxyresin-Ciba-Geigy).

used for cooking purposes out of which 7 utensils heat insulated were made as grip aids.

Assessment showed that 407 (75%) patients found grip-aids useful in their day to day activities.

CAMP SURGERY was undertaken wherever possible. This technique, which is again not in vouge in general consists of a reconstructive surgery team operating in a district at Taluk level hospital, with the aim of increasing the coverage of surgical operations.

Approximately 100 operations have been performed at various hospitals. The transfer of this technology is the slowest as its application is multifactorial. The greatest advantage was to make the service organisations like Lions, Rotary etc. to get interested in the care of leprosy afflicted and in many instances camps were supported by them.

It must be stressed that splintage at the earlier stages had obviated the need for reconstructive surgery in many cases.

CONCLUSION :

The authors firmly believe that as far as leprosy is concerned community based disability care is the first step to community based rehabilitation. If the community is to accept leprosy patients without reservations and help rehabilitation of leprosy patients within itself, the

ASSUMTPTION NO. 4

Rehabilitation of leprosy patients is still practised by voluntary organizations functioning in an institutional setup. Some of these are supported by international agencies which have still not adopted an integrated approach to training and rehabilitation. The establishment of Leprosy Rehabilitation Promotion Units of the Government of India is also institution based, and community based rehabilitation, especially in the field of leprosy is interpreted by individual organisations in their own way and may not be necessarily community based.

Attempts at integrated rehabilitation confined to Bombay, (see map) an urban or super urban situation have led to the development of a model which is ready for adoption to any comparable situations. Non-leprosy institutions (Table No. 7) offering general rehabilitation services to handicapped patients living in slums have now included leprosy rehabilitation as part of their service programme. In an urban areas, these virtually are places where patients from slums make first contact for care of deformities and rehabilitation

Table No. 7

Sr. No.	Institution	Govt./NGO	Services offered	No. of beneficiaries
1.	Vocational Rehab. Centre	Govt.	– Vocational training in electronics, typewriting, fitter and motor mechanic	6
			– Job placement following vocational training.	107
2.	Naseoh India	NGO	– Vocational training in carpentry and cycle repairing.	9
			– MCR foot wear	45
3.	3 R society	NGO	– Employment in sheltered workshop	2
4.	Fellowship of physically handicapped	NGO	– Economic assistance & telephone booth	3
5.	Adams Wylie Memorial Hosp. (Indian Red Cross Society)	NGO	– Vocational traianing in Soap making	33
6.	Shramik Vidyapeeth	Govt.	– Vocational training in tailoring & screen printing	97
7.	All India Institute of Physical Medicine & Rehabilitation	Govt.	– Aids, appliances, prosthesis, moulded footwear and disability certificate	72
8.	J.J. Hospital	Govt.	– MCR footwear	6715
			– Reconstructive Surgery	306

various components of the community, consisting of the leprosy patient, his own fellow patients, his family, and the neighbours will first have to be convinced that disability care is indeed practised by the health programme at the door step of patient, just as drugs are distributed at their doorstep. Splintage and grip aids could be dispensed at the door- step by any leprosy worker. We have dovetailed the disability care into the ongoing MDT programme and found that community acceptance of comprehensive leprosy care is quite high in rural areas (Independent

Evaluation Team NLEP 1991).

The above unprecedented experiment in diability care which is community based and operated through the existing government workers who are already offering treatment to leprosy patients at the field level has demonstrated its usefulness and with little more effort even the community may learn to take care of disability by itself.

The present experiment is carried out through leprosy workers of NLEP. If such community based effort has to be integrated with general health care services, the multi purpose worker (MPW) has to dispense these aids. Since the technology is quite simple we visualize that MPWs can perform this task and that training can be imparted to any MPW, provided the large army of MPWs can be made available for systematic training.

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SALTIEL'S DESIGN MODIFICATION : Short-leg Brace for Knee Extensor Weakness

DR. SHIV LAL YADAV*, DR. M.K. MATHUR**, & DR. S.C. KASLIWAL***

A study of an alternative orthosis to prevent hand-to-knee gait is presented. The orthosis in contrast to the standard Knee- Ankle-Foot Orthosis (KAFO) works on the principle of alignment stability by preventing an initial heel contact. Weight bearing on forefoot brings the trochanteric knee ankle line anterior to the knee which stabilizes the knee by pushing it backwards. The orthosis made of polypropylene is fairly rigid and resilient. An attempt has been made in this study to standardize fabrication technique of this orthosis. Weight and cost evaluation of the orthosis has been done. Subjective analysis regarding cosmesis and acceptability of the orthosis along with objective analysis of time motion studies is also presented. Results show its superiority over the conventional KAFO.

In clinical practice, Poliomyelitis is still a major disabling disease in India. A patient of Polio with quadriceps palsy adopts "hand-on-thigh gait" which is quite awkward, ungainly and an energy consuming trick (Fig. No. 1).

Several attempts were made to develop alternate design which would stabilise the knee joint with weak quadriceps. Saltiel1 (1969) designed, a one-piece laminated knee-locking short-leg brace by inducing equinus at the ankle artificially, to stablize knee while shifting TKA line anteriorly. Lehneis2 (1972) modified the original Saltiel design. In 1973, after many modifications, a Kumamoto University Short leg brace (KU-SLB)3 was developed with a single plastic upright on the back of the leg and supracondylar support with a cut-out for the patella. In 1988 Gai-Fu-w. Yang et al4 presented his clinical experience with Floor Reaction Orthosis (FRO) in patients with paraplegia and paraparesis. In this design they have reduced the equinus at the ankle and have used patella and patellar-tendon as reaction point.

The orthosis prepared by Saltiel (1969) was made out of fibre glass, reinforced with resins. It lacked resilience and therefore, developed stress concentration and broke early. In addition, if some minor fault had entered during its fabrication the whole of orthosis had to be rejected. This led us to think of an alternative high strength, low weight-ratio material with some flexibility in one direction. The most easily available material is polypropylene which fills our criterion; it is fairly rigid and resilient. An attempt has been made in this study to standardize fabrication in randomly selected cases with quadriceps paralysis.

MATERIAL & METHODS

The present study was conducted in the Rehabilitation Research Centre, SMS Medical College, Jaipur. The patients having quadriceps paralysis requiring knee orthosis mainly in the antero-posterior plane resulting from poliomyelitis were randomly selected and studied in detail. The present design of orthosis was provided. Patients with flail hip, genu recurvatum and severe calcaneus deformity were excluded.

The present orthosis under study was fitted to 250 patients (age group 6-31 (average) years, Male : Female :: 48:52). Five cases were having bilateral involvement, in these the other side was fitted with conventional caliper. Associated deformities like mild knee flexion, equinus, varus, valgus and cavus of the foot produced no difficulty in fitting of the orthosis as polypropylene can be shaped in any manner. The limb length discrepancy upto 5 cm did not require any additional compensation, as the present design has inbuilt equinus. Thus it automatically increases the limb length. This design stabilises

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the ankle fairly well in equinus along with control of quadriceps weakness. In addition, 34% cases in this study those who were using metal/conventional caliper earlier and switched over to this new design. The maximum follow-up was of 18 months in 130 cases while minimum was of 3 months in 11 cases. The average period of follow up was 13 months.

The field trials were carried out to evaluate the efficacy of this design. Present design and performance was judged both by subjective as well as objective evaluation at the time of fitment and during follow up.

Time motion studies of the fabrication procedure, weight and cost evaluation of the present design were also undertaken.

Casting and Fabrication

The patient is comfortably seated with the affected limb exposed upto supra-condylar region. Stockinette is slipped over the foot and leg and all the bony prominences are marked with an indelible pencil. A latex tube is placed on the dorsum of foot and anterior aspect of leg and knee.

Knee is kept in 10^{o} of flexion and ankle is kept in 15^{o} plantar flexion, while foot is kept in neutral rotation. Equinus is maintained with the use of prepared wooden block with the desired gradient.

The wet plaster of paris bandages are applied, starting from the base of the toes and extending upto the lower one-third of thigh. Keeping the limb in desired position, the plaster is allowed to set. The ankle, malleoli and patellar tendon is then outlined.

The negative plaster of paris impression is removed and filled with plaster of paris paste to get a positive mould. Then the positive mould is modified as follows. The infrapatellar & suprapatellar region are scooped out anteriorly. The scoop has to be more generous for a fleshy thigh & less so for a thin thigh. For pressure relief quarter inch thickness of plaster of paris are added over bony prominences like malleoli, patella etc. In addition the foot plate is fully modified for support of the arches snuggly.

The positive mould is then smoothened. A 3 to 5 mm. thickness polypropylene sheet, which is approximately 5 cm. more than the total length of mould and breadth equal to the maximum circumference of the positive mould is taken. The sheet is divided into 2 parts; upper 1/4 and lower 3/4 of the total length. Both the sheets are put alternately in preheated oven at 300^{o}C for 10 minutes. The hot malleable sheets thus obtained, the smaller one is applied anteriorly over supra patellar area. The large sheet is applied posteriorly from upper calf to just distal to the metatarsal heads. These sheets are well moulded by removing all creases and conforming to the sharp contour of the positive mould and allowed to cool for 20-25 minutes. The trim lines are then marked at sole (the distal end of the orthosis) at the level of head of metatarsals, half of the malleoli, anteriorly 1/4th of the leg circumference, upper calf and 5-7 cm. above top of patella.

With a sharp sculpture knife the riddened edges are cut and both the portions of moulded polypropylene sheet are fitted by grub screw on the sides at the level just above the fibular head. Velcro straps are attached at calf region, with this

TABLE NO. 1

SUBJECTIVE EVALUATION AT THE TIME OF FITTING OF OTHROSIS AND FOLLOW UP

Subjective Evaluation at the time of Fitting n = 250

Stability at Knee			Sitting Cross-Legged/ Squatting	
1	2	3		
Good	Fair	Unstable	Yes	No
180	58	12	225	25

Subjective Evaluation at the time of Follow-up 3-18 Month n = 191

Whether patient Walks Comfortable Fast > 1 Km.		Walking distance without Fatigue		Can Climb Stairs/ Ramp	
Yes	No	Same	Improved	Yes	No
156	35	8	183	172	19

Fig – 1

Fig – 2 (a & b)

Fig – 1 : "Hand on thigh gait" body weight acting from above to stabilise knee
Fig – 2 (a & b) : Floor-reaction-orthosis (FRO) allows comfortable squatting & cross-legged sitting.

Fig – 3 (a & b)

Fig – 3 (a & b) : A patient with left FRO ascends & descends the stairs comfortably

orthosis patient can put on the shoes having the sole flat and rigid. The positive model does not require to be broken. So it can be reutilised according to need.

All the patients found the orthosis very light with high acceptability, towards cosmesis and easy to wear and take it off. Only 12 cases felt instability at knee due to a feeling of insecurity because of walking on toes; later with gait training they all improved. 90% cases could sit cross-legged and squat easily (Fig. No. 2).

In the present study, majority of the patients could walk comfortably and fast (82%) and 96% cases showed marked improvement in walking distance. 90% of the patients could negotiate the stairs in the present series (Fig. No. 3).

There was marked improvement in the gait of most of patients (64%). Only 12% of cases did not show expected improvement in the gait; they used to walk with an aid of stick or crutch. All of these cases had bilateral involvement and had to be fitted KAFO/AFO on the opposite side.

Only 14 cases had breakage of their orthosis during the follow up period. Maximum break points were encountered around ankle. No patient showed adverse reaction to skin. There was improvement in the gait pattern, as 76% patients qualified to be labelled as good, which is 12% more in comparison, at the time of fitting. This improvement indicates that the patients have

TABLE NO. 2

OBJECTIVE EVALUATION AT THE TIME OF FITTING OF ORTHOSIS AND FOLLOW UP

Objective Evaluation at the time of Fitting n = 250

S. No.	Gait	No. of Patients
1	Good	160
2	Fair	60
3	Poor	30

Objective Evaluation at the time of Follow-up (3-18) months) n = 191

Break Points			Any Skin Reaction		Gait		
Knee	Ankle	Forefoot	Yes	No	Good	Fair	Poor
NIL	11	3	–	191	145	26	20

TABLE NO. 3

TIME REQUIRED FOR FABRICATION

Sl. No.	STEP	TIME
1.	PREPARATION OF NEGATIVE MOULD WITH PLASTER OF PARIS BANDAGES	20 Min.
2.	DRYING OF P.O.P. SHELL	10 Min.
3.	PREPARATION OF POSITIVE MOULD	20 Min.
4.	DRYING OF POSITIVE MOULD (IN A OVEN AT LOW TEMPERATURE)	30 Min.
5.	FINISHING & RECTIFYING THE MOULD (SHEET IS HEATED DURING THIS PHASE)	30 Min.
6.	APPLYING PREHEATED POLYPROPYLENE SHEET OVER POSITIVE MOULD (INCLUDING COOLING TIME)	30 Min.
7.	TRIMMING/FINISHING & APPLYING VELCRO STRAPS	20 Min.
	TOTAL	160 Min.

THE PRESENT DESIGN TAKES ONLY 2 HRS & 40 MINUTES TO FABRICATE, WHICH IS QUITE LESS.

COST BREAK-UP

Sr. No.	Material	Cost (Rs.)
1.	STOCKINETTE 6 CM X 1 METER	3.00
2.	COTTON BANDAGES 6" X 5 METER – 2	4.00
3.	PLASTER OF PARIS POWDER 5 – 7 Kg.	5.00 – 7.00
4.	VELCRO STRAPS 3/4" 1" X 30 CM.	7.00
5.	GRUBSCREW OF ALIMCO 2 IN NOS. @ Rs. 3.00	6.00
6.	POLYPROPYLENE SHEET 1.5 SQ FEET TO 2.5 SQ FEET @ Rs. 20/SQ. FEET.	30.00 – 50.00
	TOTAL	55.00 – 77.00
	LABOUR CHARGES 2.40 HRS.	15.00
	OVER HEAD CHARGES	3.00
	GRAND TOTAL	73.00 – 95.00

regularly used this orthosis and by sheer practice their gait pattern improved from fair to good and from poor to fair.

The present design has worked out to be of very low cost as compared to other aids. (Rs. 73.00 – 95.00 V/s Rs. 517 – 1029 for KAFO fabricated from ALIMCO components).

Discussion

In poliomyelitis, the most crucially affected level is the knee joint. Any instability at this level severely affects locomotion of the patient and caliper is required for stability.

The present design is more physiological, because it provides opportunity for free knee motion gait and maintains proper swing phase characteristics. Also the patient feels reasonably secure.

Polyprophylene is a low weight and high strength ratio material. The weight of the orthosis is much less (350 gm.) than that of a conventional KAFO (2200 gm.). This design is moulded to provide total contact, thus preventing pressure over bony prominences. On subjective evaluation it is more comfortable, cosmetically highly acceptable, easy for donning and doffing and it allows the user to sit cross-legged and squat, which is not possible with the conventional orthosis. In addition it can fit into a regular shoe and conceals well under normal trousers. It can be cleaned easily with soap and water and requires negligible maintenance as it contains no joints or movable parts.

The present design is very economical, on an average Rs. 84. A conventional KAFO made from ALIMCO components costs Rs. 517-1029. The Orthosis can be fabricated in just 160 mts., which is much less as compared to conventional orthosis. The patient can be fitted with the orthosis on the very day of his arrival.

The only disadvantage with this orthosis is that it does not check mediolateral instability at knee.

Since the orthosis is made of polypropylene, it is fairly resilient, which allows certain amount of dorsiflexion under force. So the patient inspite of equinus at ankle can squat. The amount of inversion at subtalar joints needed for sitting cross- legged is permitted which is not possible with metal or carbon fiber orthosis.

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PLANTAR FASCITIS – STUDY OF DIFFERENT MANAGEMENT PROGRAMME WITH SPECIAL REFERENCE TO UC-BL SHOE INSERT

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Plantar fascitis is a common condition seen by Physiatrists and Orhtopaedic Surgeons in their practice. Since the genesis of condition is not very clear, many treatment modalities are being used and none is in isolation. UC-BL shoe insert is the latest addition to this long list. 95 patients of plantar fascitis were included in this study and were divided into four groups from treatment point of view, one group was treated by UC-BL shoe insert. Results of various conservative programmes and effectiveness of UC-BL shoe insert has been presented.

The term plantar fascitis has often been used to designate a clinical condition in which the patient usually complains of pain on the anteromedial side of plantar aspect of the heel, characteristically worse in the morning and after a period of rest. Other eponyms like calcaneodynia (Shilinikor, 1933), periostitis of oscalcis (Chang, 1934), sub-calcaneal bursitis (Eggers, 1957) and plantar spur syndrome have also been suggested for this condition, but painful heel syndrome seems to be a better term for this condition, the aetiology of which is still shrouded in mystery.

Since the genesis of condition is not very clear many treatment modalities are in vogue and none of them is infallible. It is also true that none of the modalities is used in isolation. Conservative treatment modalities being used are –

– Hot fomentation, contrast bath, ultra sonic therapy, analgesics/anti-inflammatory, paraffin wax bath, heel elevation, cushion heel, faradic bath and local hydrocortisone infiltration etc.

The latest addition to this long list is use of UC-BL foot support. In present study we used UC-BL foot support for treatment of plantar fascitis in socio-cultural realities of our country and compared its results with above mentioned modalities.

Pathogenesis of plantar fascitis and biomechanics of UC-BL foot support

In 1954, Hicks[1] described the powerful contribution of the plantar fascia in stabilising the foot from heel raise to toe off. Since the attachment of plantar fascia is distal to the metacarpophalangeal joints, extension of these joints as occurs with dorsiflexion of toes causes tension on the fascia, Hicks called this mechanism 'The Wind-Lass Effect' of the plantar fascia. As the toes are dorsiflexed, arch of foot rises and affective length of the truss (intrinsic musculature & plantar fascia) is shortened. At this high arch position the tension on the truss required to support the arch is less than that it would be in a low arch position. Generally agreed view regarding causation of plantar fascitis is that it develops as a result of strain on the calcaneal attachment of plantar fascia. The resultant inflammatory process may stimulate a proliferation of bone into the fascia to secure the attachment leading to development of a heel spur. The continuing pull of the fascia in weight bearing position perpetuates the inflammation and a chronic pathology develops. So, to treat a case of plantar fascitis we need to elevate the arch so as to relax the plantar fascia to avoid chronic strain.

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UC-BL shoe insert meets all these requirments.

The UC-BL shoe insert was developed at Biomechanic Laboratory in San Franscisco (California) as a part of several research projects on mechanics of foot. It was considered that UC-BL shoe insert should be able to take over, at least in part, the contribution of plantar aponeurosis to longitudinal arch stability by holding the foot in a position that relieves tension on the plantar fascia and by holding the heel in inversion and by applying forces against navicular and the outer side of the forefoot, without direct pressure on the soft tissue under the longitudinal arch[2].

Material & Method

For the present study 96 patients were selected. Clinical history was carefully taken specially regarding pain, its site, duration and severity for symptoms suggesting a definite aetiology, to find out associated diseases, and trauma etc. In local examination considerable attention was paid to foot abnormalities like depressed longitudinal arch and to fact whether it was mobile or rigid. A careful examination of tender area, ankle and subtaloid joint, blood examination for erythrocytic sedimentation rate and X-ray studies were done. For treatment patients were kept in 4 groups and the following treatment programme followed :

Group – I : 25 patients i.e. 36 heels were treated by
- Analgesics
- Heel elevation to a total heel height of 1 & 1/2"
- Heat in form of contrast bath

we were able to follow 33 heels.

Group – II : 25 patients i.e. 27 heels treated by
- Analgesics
- Ultrasonic therapy 1.5 watts/cm^2
- An elevated heel in shoes or in chappals.
- 26 heels of this group could be followed.

Group – III : 25 patients i.e. 27 heels treated by
- Analgesics
- Heel elevation

Inj. Triamcilone 10 mg. with 2 ml. of 1% Xylocaine. 3 injections were given in the tender area at the intervals of 1 week

25 heels could be followed

Group – IV : 20 patients i.e. 26 heels & treated by
- Analgesics

OBSERVATIONS

TABLE

Results of Individual groups

Group	No. of heels followed up for 6 months	Results					
		Good		Fair		Poor	
		No. of heels	%	No. of heels	%	No. of heels	%
I	33	17	51.51%	5	15.15%	11	33.34%
II	26	15	57.69%	4	15.38%	7	26.93%
III	25	13	52.00%	6	24.00%	6	24.00%
IV	26	22	84.62%	4	15.38%	0	–

	— UCBL support in leather sole shoes.
Good	= complete relief
Fair	= partial relief
poor	= no relief or worsening of symptoms

The table shows that good results were maximum in group IV (84.62%) & poor results in first group.

In group IV none of the patient showed poor results.

On analysing the good results obtained with various treatment programme in our study, it is evident that group-IV programme was most effective, next in order of good results was group II, while there was not much difference in group III & I. The results of various group were as follow:

Group IV	— 84.62%
Group II	— 57.69%
Group III	— 52.00%
Group I	— 51.51%

The overall results of conservative methods of treatment in present series were as follows :

Good	: 60.90%
Fair	: 17.27%
Poor	: 21.27%

DISCUSSION

Benefit of relieving tension in plantar fascia in cases of plantar fascitis has been studied in the past using various methods. Rose[3] obtained good results in his cases of painful heel syndrome by using a wedge shaped insole. In the study conducted by Furey[4] (1975) 71 percent excellent or good results were claimed with combined use of analgesics (Phenylbutazone) and shoe modifications in form of raised heel, thick sorbo rubber heel pad and arch support. It was felt that the beneficial results were because of support to the arch provided by this modified insole.

Hick[1] (1954) discussed the windlass effect of plantar-fascia and confirmed that elevation of arch of foot relaxes the plantar fascia because with decreased angle of truss, length of tie is reduced and hence tension required by tie to support truss is proportionately reduced. Compbell & Inman[5] (1954) recommended UC-BL shoe insert and reported 33 resistant cases of painful heel (not responded to phenylbutazone, heel cushion, arch support, and local injection of steroids) which were fitted with UC-BL shoe insert and good results were obtained in 31 cases, 2 cases which did not respond were later diagnosed to be suffering from Reiter's disease. Discussing the role played by heel elevation, Rene Cailliet[6] (1983) in his book on "Foot & Ankle Pain" maintains that raising the heel removes the tension placed on the calcaneum by Achillis tendon and releases the tension of the fascia by plantar flexing the forefoot. The results in the present study series although comparable to those obtained by Furey[4] (1975) i.e. 71% seem to be less successful to those claimed by Lapidus at (1965)[7]. The explanation for this difference in his percentage of successful results, according to this study, appears to be that shoe modifications in the form of heel elevation were resented & refused by some females. When these patients reported for follow up they were found wearing usual flat heel chappals and on being closely questioned came up with the assertion that they had been using the modified version at home. This is difficult to believe for a patient who did not use the modified version when reporting for follow up, would be hardly making use of it, away from the eyes of treating physician.

Another factor which may be responsible for the poor results in his present study was that once the patient had some initial relief with a particular programme of treatment he or she may have ceased to follow the advice fully which may have resulted in a recurrence of symptoms.

As far as the beneficial role of injections of Triamcilone Acetonide is considered, it was observed in present study that although immediate relief was there, but pain recurred in quite a number of cases within 4-8 months (8 cases). Furey[4] (1975) made use of a combination of Prednisolone acetate 50 mg., Dexamethasone 4 mg. & Lidocain 10 mg. & reported long lasting

excellent to good results with only one inj. in most cases, though he had to repeat the injections second time and rarely third time in some of the cases. Since such a combination was not used in present work, it is beyond the competence of this study to make any comments.

CONCLUSION

The study showed that the strategy regarding treatment should be individually tailored. It is worth while to try analgesics, heel elevation and contrast bath or ultrasound alongwith heel elevation in the 1st 15 days of the treatment. If the patient is not having desired relief then UC-BL shoe insert should be prescribed. Although this study is in a preliminary stage even then it created an impression that in place of trying empirical treatment based on unproven hypothesis, UC-BL foot support should be tried as the standard aid. Local steroids are quite effective in severe pain but recurrences are common.

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RECONSTRUCTIVE SURGERY OF LIMBS IN LEPROSRY – PRESENT STATUS

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Due to a better understanding of the mechanisms of nerve damage, a concept of " Preventive Nerve Surgery" has come up during the last few years. The genesis of plantar ulcers are better understood now. The recent developments in the treatment of paralytic deformities of hand and foot have been outlined.

During the last decade leprosy surgery has witnessed an approach based on much desired sound anatomic and physiologic principles. The older concepts have been re-examined in the light of new scientific knowledge and answers have been found for the various questions which were cluding the leprosy workers since long.

Peripheral Nerve Surgery

Sunderland's[34] classic work on anatomy of nerves trunks contributed to the indepth understanding of spread of infection and involvement of nerve trunks by disease process. Carayon6, who saw his first case of neuritis in early fifties, investigated the problem of nerve damage in leprosy using contrast radiography and conclusively demonstrated the role of external factors in progression of nerve trunk damage and surgical removal of these factors in preventing, reversing or arresting further neurological deficit in these cases.

Nerve compression studies in experimental situations and its effect on neural blood circulation and nerve conduction velocities have been well documented.

Nerve damage can occur even before there is significant clinical nerve thickening. Nerve conduction studies can indicate the nerve damage and also help to locate the site of damage but nerve damage to certain extent has to occur before it can clinically or electrophysiologically manifest. Nerve compression is known to exist even without any conduction velocity changes as documented in some cases of carpal tunnel syndrome.

Even though nerve surgery in leprosy was being done since nineteen thirties, the operations were restricted to cases of established paralysis and aimed to relieve intractable nerve pain. Since the anatomy of nerve trunk was not well understood at that time the procedures then practiced were such that would damage the blood supply of nerves – desheathing procedures and/or damage the continuity of nerve fibres-deep multiple longitudinal incisions in the nerves. Carayon7 performed internal neurolysis respecting the nerve anatomy and thus fascicular neurolysis came into existence where diseased nerve bundles in the nerve trunk were dissected under magnification and could be excised.

Various workers reported their results on nerve decompression in eighties and listed different indications for nerve decompression (1, 5, 9, 12, 19, 24, 25, 35). A review of the results suggests that earlier the operation, better and quicker is the sensory- motor recovery; less damaged nerves having better chances of recovery. Surgical intervention is urgently required for cases having acute nerve compression and sudden paralysis. Chances of recovery are better in these situations. The routine specific anti-leprosy and anti-inflammatory drugs together with rest to the nerve by appropriate splinting, if fails to improve the sensory motor functions, more decompression is indicated. In cases of posterior tibial nerve, recovery with medicines alone is rare, hence early surgery is advocated.

The procedures of epineurotomy and fascicular neurolysis are performed exercising maximum care, preferably using magnification, so

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as to ensure that no damage is done to the nerve fibres and vasculature during surgery. In case an epicondylectomy is done, an elbow splint and sling has to be used at least for three weeks.

Steroids have been found to improve the results of nerve decompression procedures. Clofazimine – an antileprosy drug which has an anti-inflammatory effect also, has been used in lepromatous cases alongwith steroids to bring down the inflammatory process. Obviously an appropriate combination of the medical and surgical measures in treatment of early nerve damage is ideal.

Neuropathic Plantar Ulceration

Plantar ulcers, a cause of social rejection and physical suffering to the patients, are more commonly seen in forefoot[27].

Studies on rat foot using mechanical automated hammers supplemented with thermographic and histological examination of the experimental feet has revealed several interesting facts about genesis of plantar ulcers. The role of sustained minor trauma in the genesis of plantar ulcers has been substantiated. Repeated moderate pressure has been shown to induce thickening of stratum corneum of the skin of sole. This repeated pressures also set up a low grade inflammation as actual necrosis occurs followed by autolysis and blister formation. Blister ultimately gives way resulting in an ulcer.

Similar situations exist in patients who have anaesthesia of the skin of sole. They can stand on the same foot for long periods of time and can walk longer distance without getting pain. This repeated trauma damages deeper tissues resulting in necrosis and ulceration. The forefoot has to bear maximum stress during walking and hence more frequently gets ulcers. In addition to local trauma it produces, walking on open ulcers squeezes bacteria into healthy tissues around and spread the infection. Since pain sensation is absent all protective reflexes are lost and the damaged foot is continuously and excessively used.

Paedobarographic measurements on normal individuals, while walking fast and running, has shown concentration of pressures over one or two areas of the sole of their foot.[8] In response to the feeling of discomfort they soon change their gait so that the area is relieved of the stress and other parts of the foot are allowed to take the stress in turn. These types of change do not occur in leprosy patients because they do not feel pain.

The stress is accentuated by paralysis of intrinsic muscles of foot. Intrinsic muscles in foot pull the metatarsal heads up off the ground, during push off phase thereby easing local pressures. This capability is lost when these muscles are paralysed.

The denervated foot is somewhat ischemic also because of strangulation of posterior tibial artery due to inflammatory fibrosis the nerve and artery sharing the same neurovascular sheath. Dryness of the skin of sole, due to autonomic nerve damage, leads to fissures and such foot easily succumbs to ulcerating process.

The sites of compression in the course of posterior tibial nerve are in the tarsal tunnel and calcanean tunnels. Posterior tibial neurovascular decompression, if done early, can help to save these feet to some extent. It improves circulation because of simultaneous arteriolysis and sympathectomy of posterior tibial artery.

Paedobarographic studies have shown that walking on hard cemented floor generates pressure under bony prominences of sole whereas walking with a microcellular rubber footwear tends to diffuse down this pressure. Moulded insoles further reduce these "pressure points" by equally distributing pressures as they bring large area of sole in contact with ground. However, it should be borne in mind that some low grade pressure still exists with these modified footwears. Therefore, an extremely long walk or a succession of walks is likely to produce enough inflammation and damage. Surest sign of an impending danger is an area of local warmth in the skin of sole.

The patient has to learn to walk gently and take shorter steps, need not run or jump. Rockers have been used in shoes to alter the forces of push-off phase with successful results. Metatarsal head excision and procedures to take off weight from metatrsal heads have come up in recent years with variable results.[30] These should be reserved for selected group where preoperative standing and walking foot print studies have shown areas of high pressure under metatarsal heads. The excision should be conservative and foot should not be unduly shortened. Ideal test to

make such a decision is record local hot spots after some test walking. A positive record will indicate surgery.[26]

Role of zinc in wound healing has been documented in studies on skin burns and finger injuries.[10] It has been shown that the resulting scars are soft and supple. Zinc oxide ointments in vaseline base are widely used now. Recent innovation is a water proof zinc oxide adhesive tape which can be used for dressing the ulcers and wounds on extremities. Frequent change of dressings is not required if these tapes are applied on to the wound surface to cover them. In practice, these tapes are useful only for minor injuries and small ulcers.

Two tailed tibialis posterior muscle transfer using circumtibial route is being performed for correction of drop foot.[28] The toe extensors however, should be strong enough to bear the pull of transfer. The procedure gives a more balanced correction. However, a recent report about long term follow-up study of corrected drop foot, by two procedures has mentioned that one tail procedure also gives more or less similar results.[11]

Hand Deformities

Claw finger deformity can be corrected by number of available procedures, latest being pulley insertions and intrinisic reactivation procedures16. In the pulley insertion procedure, A1 – A2 pulley is used as an anchor over which the transferred motor slip exerts its force thereby flexing the proximal phalanx.[13] In original Zancolli's "Lasso" technique A1 pulley is used as anchor.[26]

Use of A1 – A2 pulley gives very good results in cases without long flexor contractures whereas original "Lasso" is being performed as salvage procedure for cases with proximal interphalangeal joint contractures.[15] Various modifications of "Lasso" procedure have been reported.[2] Intrinsic reactivation procedure is recommended to be used for cases who have reversal of distal transverse metacarpal arch. Here the transferred motor is elongated to give five slips which are looped round the tendon of interossei for each finger.[21]

Extensor diversion procedure is a passive correction procedure. The hyperextension of MP joint is prevented by a slip of tendon attached to lateral band and the long extensor. It is claimed that no re-education is required and post operative appearance is good. This procedure does not correct the sequence of flexion of fingers which is so important for the grip. Tip still flexes first and rolls inwards into palm. Dermadesis and pulley advancement procedure[33] has also been tried for restoration of function and correction of deformity in ulnar claw hand.

Correction of paralysed thumb deserves special mention because it is still a difficult problem in leprosy surgery. Isolated median nerve paralysis in leprosy is rare. Most of the cases have combined low ulnar-median defect or high ulnar low median type. Classical Brand's sublimis 'Y' transfer is not very successful and at times when the joints are supple a swanneck deformity results where MCP joint hyper-extends and IP joint flexes. The pinch becomes weak. Extensor indicis as opponens has been used either singly or in combination with MCP joint stablisation procedures.[17, 22] Extensor pollicis brevis has been tried as an abductor together with MCP joint stabilisation with variable success.[23] Flexor retinaculum has been tried as a pulley for abductor-opponens replacement because it is fixed, stiff and centrally located.[31] Its use as a pulley makes the transfer more physiological if we consider the origin of abductor pollicis brevis.

Transfer of radial half of flexor pollicis longus to extensor pollicis longus around the thumb metacarpal over the dorsum of middle of proximal phalanx is being used to stabilize MCP joint at some centres and has been found to be satisfactory.[14]

Sensory re-education technique has been tried in selected group of patients with encouraging results. However, it is time consuming, requires patience and is tiring. Nerve transfers and innervated skin flaps have been attempted to restore sensations in anaesthetic limbs with variable success. It will be premature to comment on those at the moment but this definitely points towards a better future and new hope.

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RURAL POLIO DISABLED – REACHING UNREACHED THROUGH COMMUNITY BASED REHABILITATION : AN ALTERNATIVE STRATEGY IN PLACE OF CAMP APPROACH

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Community based rehabilitation as a concept, a decentralised process having economically realistic approach towards comprehensive integrated rehabilitation of the disabled. Low cost caliper designed and developed at our centre has given encouraging response to the Polio affective children.

WHO estimated that there are about 120 million people with disabilities in the World, who require rehabilitation services. Only 2-3 million received some form of rehabilitation. Rehabilitation services are at present grossly insufficient especially in the developing countries. The existing urban based institution are able to reach only a minimal proportion of the disabled, probably some 2-5% of them in the developing world. Extension of traditional pattern of services in the near future is beyond the means of most of the countries due to financial, technical and manpower constraints. It is therefore not possible to provide rehabilitation services to all in need, unless the services are decentralised, becomes community based and integrated with general services in the area of health, education, employment and social facilities.

CBR as a concept, a decentralised process having economically realistic approach towards comprehensive integrated rehabilitation of the disabled. According to Dr. E. Holender, chief of Rehabilitation, WHO, the future of Rehabilitation lies in understanding that rehabilitation gap can be closed if the following is recognised –

1. CBR is a most realistic approach and its success relies on the willingness of the communities to provide the necessary local resources.
2. National Governments must be fully committed to the community based services.
3. The main constraints is the lack of adequately trained community workers.
4. There is also lack of coordination among the donor organization in the developing countries.

Now the question is how to provide essential rehabilitation services within the context of community services and to integrate rehabilitation and disability prevention into the existing health delivery system and other relevant sectors. Krol (1982) has attempted to answer these questions based on the following principles :

1. To provide essential rehabilitation services using the Primary health care approach, thus using the community level action rather then highly sophisticated institutions.
2. To encourage participation of the community and in particulars to involve families/disabled in the rehabilitation process.
3. To promote use of approaches and technologies which are feasible, affordable and appropriate to local environment.

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4. To develop community based infra-structure for supervision, training and referral, using existing health and related general services.

During 16th World Congress of Rehabilitation International held at Tokyo, Japan during September, 1988, where 5 case studies on CBR projects from Nepal, Sri Lanka, Kenya, India and Thailand were presented. A noticeable point in 5 CBR was that each project in some way unique in its structure, responding to needs or resources of different countries and communities.

The common element in all was the family. A number of points of general interest emerged from the discussions on the CBR.

- Persons with disabilities must organise themselves with the active involvement of their families and their communities.
- Transfer of knowledge and technology must take place on a massive scale if CBR is to succeed.
- A caring relationship must be established between disabled person and the community.
- Active links must be forged with the primary health care system.
- CBR cannot succeed without an active link to the community development process.
- Confidence and trust of the communities is critical for the work of a CBR worker.
- Negative attitudes are the biggest constraint facing and CBR programme.
- The importance of on-going training and good professional back up support cannot be overstated especially during early stage of project.
- NGO's act as innovating agents to set up CBR which are later proceed on the government for large scale application.
- There is shortage of trained personnel, lack of supervisors, scarcity of models, & lack of planners due to which progress is stand still.

Patience and persistent work is needed to produce results.

In order to reach families with disabled polio children with useful information which will benefit the child and the entire family, a programme of information collection and dissemination has to be launched at National & State level. Appropriate materials, providing practical information on disability prevention to parents and the community at large are needed for a successful CBR programme.

Appropriate Technology & CBR

The role of technology in prevention, early detection and rehabilitation is unquestioned and there is no doubt that technology helps the disabled person in gaining increased independence, mobility and ambulation access to employment, improved communication ability and improved quality of life as a whole. In his key note address during World Gongress of R.I., Dr. Ramalingaswami, said, Technology must preserve and enhance human dignity.

There are many devices being developed today to assist persons who are physically disabled to lead normal and independent living. These relate to feeding, toiletry, reading, recreation, and transportation. Appropriate technology is most relevant to CBR. Fortunately, by now, it has been realised that appropriate technology is not inferior technology but it is a technology that utilises local material, skill and it is firmly based on scientific principles. The light weight wheel chairs, which can be easily used on village road, sturdy, and based on simple technology has been developed. Similarily, Low cost Calipers for polio effected children have been developed which is not only affordable and simple but can be prepared by minimal skills in village settings. Jaipur foot and metal prosthesis is another examples of work done in the field of appropriate technology. The development of a low cost hearing aid that could be mass produced for the developing countries has also been reported.

Model of community Rehabilitation :

A three-tier model has been designed based on primary health care system with provision of interaction with other sectors related to disability (Krol, 1982).

1. Basic community level
2. Intermediate support

3. Specialized services.

Basic Community Level :

BCL is made of the families of disabled persons, local community Rehab. workers, general community services and specific community infrastructure. This is so designed to provide essential rehabilitation services in local environment, at home and immediate surroundings of the disabled persons. The family needs motivation, interaction and support, to be provided by community rehabilitation worker. He can be a local primary health care worker, teacher, social worker or any other community worker who is willing and able to undertake the task and has been given some simple training to this effect.

The duties of CRW will also be, in addition to motivation, training and direct supervision of the family/disable, to identify the disabled, assess or refer for assessment counsel and follow up instructions from the referral level. Existing local infrastructure and general community services like community development, health, nutrition, education, employment and social facilities constitute important element of support to the family in its rehabilitation tasks.

Intermediate support (I.S.)

I.S. gets help mainly from existing facilities and personal from the general health services like primary health care Centre, district hospital. I.S. has to take use of other general services like education, training/employment, social welfare which are available at district level.

Medical and para medical staff like nurses, midwives, social workers & teachers etc. who are available at this level must be given orientation and appropriate training in the field of disability, to enable them to train and supervise the local CRW and provide first referral level services.

In the long run, a multipurpose rehab. worker is needed at this level who should act as a local team member to take care of the Community Programme, Planning and Management.

Specialised Services :

The Apex of the model is made up of specialised services including medical rehabilitation, special education, vocational and social rehabilitation in addition to their usual tasks of specialised service delivery, training of manpower, research and development. They should be oriented to stimulate development, of Community programmes, give support to and complement the whole CBR. They are most precious expertise resource to the CBR.

Specialised rehabilitation services do exist in almost all countries, but the basic community level services and intermediate support do not exist as part of the operational Rehabilitation scheme.

The Disability Situation in India in Relation to Polio

More then fifty percent of Orthopaedic disability in rural India is due to Poliomyelitis. A rough estimate puts 200.000 cases of Polio are added every year. (Rama Lingaswami, 1983). In a study at R.A.L.C., K.G. Medical College, Lucknow during 1987, we have observed that out of 3624 cases of childhood disability, 2134 cases were due to poliomyelitis (58%). In our experience of nearly thirty rural camps, in the past several years (1972-1990) more then two third disabled cases were of Poliomyelitis.

Appliances for Poliomyelitis :

Since Poliomyelitis is the single largest cause of physical disbility in our country and it has practically disappeared from west, hence not new ideas are coming from abroad on designs of appliances for Poliomyelitis. Therefore we have to generate new thinking in the whole situation. We have been using conventional metal calipers over decades, but any sincere fellowup would reveal that there are large number of such cases who do not use the calipers after taking the delivery from the hospitals. Dr. P.K. Sethi in his prestigious lecture delivered on 16th Jan., 1989 at Indian National Science Academy, had analysed the situation of designing aids for Poliomyelitis as suited to rural India. His philosphy and thoughts are quite relevent to our present day. According to him, three different kinds of options are available for aids in Poliomylitis. One is to continue with the present strategy of a centralised production agency, supplying factory made metal components, to be assembled and fitted locally. It does not permit any change in design and needs a large beaurocratic machinery to manage the supply and fitting. Second is to continue research into the use of new material and design and field test them. It requires a much of R & D efforts, specially multicentre study in our vast country. Third is to simplify the existing designs and work out a strategy of using rural craftsmen and local material to provide a community based facility.

The cost and benefit of each will have to be worked out. Keeping in view the user who would remain and belong to group of rural poor.

Present Day Situation of Appliances :

An analysis of the reasons for long waiting list in the delivery of calipers in most rehabilitation centres, reveal that the major hold up occurs in the foot-wear section. In practice, the shortage of good skilled workers add to the problem. The idea of subsituting shoes with wooden clogs as initially started by Huckstep in Uganda has many drawbacks. Hence more hard work has to be put to redesign the clog which allow better gait. This wooden clog can be made easily and with pre-fabricated leather straps and uprights of different sizes, it is feasible to fit the child on the same day. Every village has a cobbler, carpenter and a blacksmith who are needed by rural community. Their innovative skill and capacity can be very well utilized in making their own version of a caliper.

Low cost calipers thus developed at RALC, Lucknow had the simillar experience i.e. shoes were replaced by tyre sole sandles made by roadside semi urban people who are catering the needs of poor since ages. The uprights were also made out-side of RALC by semi skilled persons. Both were assembled and delivered to Polio child on the same day. We have fitted more then 500 such calipers. The initial response was encouraging.

RURAL POLIO CAMPS : PRESENT & PAST

We have experience of large number of Rural disabled camps in last two decades where a large number of polio came with hopes & expectations out of which in atleast 20% to 30% cases, the deformities are such, which can not be corrected hence the mobility aids like tricycle, wheelchair are the only answer. In remaining cases nearly 40 to 50% will require reconstructive surgery before we can fit proper caliper to them. Therefore only a small percentage of cases are available for the measurements of the calipers. We have under taken even three stage camps where we were able to satisfy only a small percentage of Polio victims. We have a feeling through camps an awareness creeps in the local area, where people came in large number. The philanthropic and service organisation provide services during the tenure of their office holding which, they tend to forget as the time passes. The question of followup does not arise in these situations. In view of these observations, which will be shared by all, who are involved in the disabled welfare programme or who have participated in such camps will like to share with us that camp approach for the rural areas provide the benefit in other spheres like catract surgery, medical checkup and immunisation etc. However in case of Polio affected children and adults only some of them can be benefitted by providing some mobility aid on the spot, provided the supplies have been adequately procurred before hand. There is no doubt regarding the awareness it generates among the masses which is not available at the moment. The demand of rural population can only be met by taking the programme to the grass root level & with active participation of the community.

D.R.C. Programme of Rural Polio Affected Disabled

Ministry of Welfare, Government of India, has envisaged a pilot project in India through which 12 District Rehabilitation Centres have been opened in different parts of country to provide all the facility to rural physically disabled. It includes identification, registration and individual detailed assessment of the disability where polio victims are also included. DRC Scheme provides medical, para-medical & technical expertise. It also provides an opportunity to the local community for its active and meaningful participation in the programme.

It has further scope of redesigning the calipers and other mobility aids which suits to our socio-cultural environment. Although the existing model of DRC has been revised due to financial constraints. However, the present and modified module further require critical assessment and evaluation so that the services can be made more effective and strengthened. DRC scheme requires much more coordinated efforts with the existing health delivery system and with integrated child development schemes to avoid duplication of the services and to provide better utilisation of existing services. This will really streamline the project and inturn it will reach to target group.

The future plan of opening of 100 new DRC in the eighth five year plan, will provide services to the atleast one fourth of the population of India in

phased manner. The success of Rehabilitation programme of Rural Polio disabled will depend on the following :—

1. Effective immunisation programme in general and rural areas in particular.
2. Generation of awareness in the rural areas regarding facilities available to the rural polio affected children.
3. Effective service delivery system through DRC Scheme.
4. Provision of Integrated Education for disabled children.
5. Vocational training and placement to the disabled though various rural based schemes of employment.

N.G.O's & Rural Polio Disabled :

As we all agree that no government programme can be successfully implemented without the participation of the people. The probelm of Polio disabled in our vast country is so big and complex that we can not overlook the role of N.G.O's in our overall endeavour. Government is encouraging N.G.O's in the field of rehabilitation of disabled by providing financial assistance and other technical help through National Institutes & Regional Rehabilitation t raining centres etc. Now the time has come, we ourself, should encourage atleast one N.G.O. in each district. This will help in active participation and service delivery at periphery. They must come forward and generate their own resources for the noble cause. We can look forward to big industrialists, public sector undertakings, financial institutions to adopt at least one block of one district for rendering the social service through the existing infra-structure of DRC scheme.

Government & Rural Polio Disabled

We look forward to Government of India for liberal welfare measures including tax benefit for such work, which will provide the incentive to the big houses for investment. Although there is exemptions for such donations to N.G.O's who are under taking these programmes. Similarly more funds can be very well invested by Non Resident Indians (N.R.I.) if Government provides some incentives to them. We feel there should be no financial constraints if Government & public sectors have will and a desire to pour their funds which will add to the per capita income of these disabled, the prosperity thus gained will not only make them independent but country will feel proud of them.

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MANAGEMENT OF LOW BACK PAIN – Critical Evaluation

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Prospective study of 102 patients were conducted for low back pain from January, 1990 to July, 1992. Young adults (55) and sedentary workers (49) are more prone to low back pain. Idiopathic group (49) dominated in series.

All the patients were treated by conservative method except 4 who had gone for surgery. Thirty six patients showed excellent and rest showed good (27) and fair (27) result.

Low back pain is common disorder of musculoskeletal symptoms. Only in small group of patients any organic lesion can be found out and therefore in many cases etiology is speculative and treatment is emperical. This study is proposed to explore the various etiological factors and its implication on management.

Material and Methods :

Patients with low back pain were selected from the Outpatients department of University Hospital, Varanasi from January, 1990 to July, 1992.

Patients were examined clinically and radiologically to detect any spinal lesion. Clinically low back pain was defined as pain between lower ribs and the gluteal folds with minimal radiation to thigh and knee. In female pelvic lesions were excluded by gynaecologist. Various investigations included radiograph of spine and sacroiliac joints, Rheumatoid factor, HLA B27 antigen. The patients were grouped in specific disorders and idiopathic group where no cause was attributed for low back pain. All patients were treated by different methods. Bed rest was adviced as complete hard bed rest for 10 days and diclofenac sodium 50 mg. was given only at the demand. In drug group diclofenac sodium is given in doses of 50 mg. three times in a day for 10 days after meals and in other chloromazonone is given as 100 mg. three times in day for 10 days. In both the drug group, mobility was allowed. Spinal exercises was adviced as back extension exercises 15 minutes three times in day. Short wave diathermy was given, as 11 meter (27.33 Hz) 15 minutes daily at one day interval for 10 sitting. Lumbosacral brace was given for day time and in night, bed rest was adviced, pelvic belt traction was given daily for 10 days. Eleven patients were excluded from treatment (Tuberculosis 7, Rheumatoid 4).

Observation and Results :

Hundred and two patients were studied. Idiopathic group dominated the series (Table 1). All the patients were treated and results were shown in (Table 2). Patients were followed up to average of 12 months, eight patients developed recurrence of low back pain. Evaluation of pain was done by pain and functional assessment scale (Jackson 1992). As per grading twenty five patients were in excellent group, fifty patients were in good and twenty seven patients were in fair group.

Discussion :

Various factors have been speculated for the causation of low back pain. Low back pain tends to begin in the third decade of life and reacts its maximal frequency during the middle age (Biering et al 1983). In our series 55 patients (53.9%) belong to 3rd and 4th decade. Individual height, weight and body build do not have any correlation

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Table 1 : Showing the Age, Profession and Diagnosis of the Patients.

Age (Years)	Number of Patients
15–20	12
21–40	55
41–60	35
Profession	
House wife	22
Student	21
Sedentary worker	49
Manual worker	10
Diagnosis	
1. Idiopathic	49
2. Non specific sacroilitis	10
3. Lumbar spondylosis	9
4. Disc prolapse	8
5. Tuberculosis spine	7
6. Rheumatoid	4
7. Old trauma	4
8. Spondylolisthesis	4
9. Lumbar canal stenosis	2
10. Osteoporosis	3
11. Ankylosing spondylitis	2

Table 2 : Showing various form of treatment – Low Back Pain Patients (Total N = 91).

Treatment		Duration less than 3 weeks			Duration more than 3 weeks		
		E	G	F	E	G	F
1. Bed rest	21	10	3	2	3	2	1
2. Diclofenac	12	4	2	1	2	2	1
3. Chlormezonone	12	2	1	3	1	1	4
4. Spinal Exercises	11	2	1	2	2	1	3
5. Short wave diathermy	15	3	3	1	–	1	1
6. Lumbosacral brace	06	–	2	2	–	1	1
7. Pelvic belt traction	10	2	1	2	1	2	2
8. Laminectomy	04	–	–	–	2	1	1

E = Excellent, G = Good, F = Fair

to the occurrence (Pope et al 1985). Low back pain is common in 35 per cent of sedentary workers and 45% of heavy handlers (Rowe 1969). In this series also 49 patients (48%) are sedentary worker. It may be attributed to the abnormal postures and poorly developed back muscle. There is no predilection for sex but operation for disc are performed twice as often in men as in women (Sprangfort 1972). Risk factors associated with severe low back pain jobs with repetitive heavy lifting, the use of machine tools, the operation of motor vehicle, vibration, smoke (Kelsey et al 1984). Pain in lumbar spondylotic spine could be result of dysfunction, instability and stabilisation phase as stiffness (Kirkaldy-Wilis et al 1982). Puig et al 1982 demonstrated diminished amount of endorphins-chronic low back pain. Devor M (1989) postulated new theory of low back pain, that various centres in brain stem can be modulated by various psychological influences and can alter the production of pain mediating chemical substances such as enkephalines, serotonin etc. Because of this person interprets more pain when he is tired or depressed. In rats genc for special type of pain sensitivity has been found (Wall 1990). Free nerve endings are present in outer part of the annulus fibrosus is the dorsal longitudinal ligament and in the facet joint capsule (Bagduk 1988).

The pathomechanism of pain in spondylolisthesis may be due to instability as demonstrated by traction and compression radiography (Freberg 1987). Similarly in spinal stenosis various obstruction caused by mechanical compression results a pain. There is always a doubt over investigation like EMG, Myelography, CT-Scan, MRI. All have been used and have demonstrated 90-98% disc hernia in patients with appropriate symptoms. In normal volunteers without known symptoms 28-35% show the same finding (Boden et al 1990, Wiesel 1984). The natural history of idiopathic low back pain is good and 90% of patients return to work within 6 weeks (Frymoyer 1988). In our series the conservative treatment seems to be good as it shows relief of pain in 64 LBP patient out of 91 and no recurrence was seen in 12 months follow up.

Prospective randomised trial have demonstrated effectiveness of pain suppression and return to work with few days bed rest and education at back program (Zachrisson-Forsell 1981). Nachemson 1992 reported good relief of pain in patients with chronic low back pain less than 3 months by bed rest, medication manipulation and general fitness exercise.

The only evidence of treatment effectiveness can be evaluated by randomised double blind controlled trial which in our set is very difficult to perform.

Regarding the management of low back pain it is clear that ill conceived diagnosis behaviour on the part of surgeon can lead to abnormal low back pains which may lead to abnormal treatment behaviour.

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DECUBITUS ULCER (PRESSURE SORES) IN SPINAL CORD INJURY

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Decubitus Ulcers are constant potential and real problem in chronic disease, specially in the cord injured patient. Consideration of the numerous physical factors, nutrition, anaemia & infection are necessary in order to successfully prevent and to treat this frequent and serious complication. Continued emphasis & training of all personnel involved in patient care, including the physicians, surgeons, nursing personnels, dieticians, physical therapists, occupational therapists and others, is essential. Most important, however, is the training of patient and his awareness of the various contributing factors, since he is the member of the health care team with the deepest interest in the prevention of his problem.

Pressure sore is one of the important preventable complication in spinal cord injury cases. Neglect in the case may lead to repeated ulceration resulting in hospitalisation, loss of mobility and social adjustment. In the spinal unit where proper nursing care is available occurence of pressure sore minimises.

One of the carliest lesson for the patient to learn is, prevention of complication and adjustment to life pattern. Sometimes it is found in the incomplete lesions at the onset of accidents and thus becomes a major management problem in non- specialised area.

PATHOLOGY

Pressure sore occurs mostly in the region where skin and subcutaneous tissue overlie a bony prominence. The common areas are sacrum, greater trochanters, ischial tuberosities, medial and lateral malleolus, calcaneum, occipital area, kyphotic spine, prominent ribs & shoulder region. Pressure sores can be classified according to a system recommended by the National Spinal cord Injury Data Collection system.

Table : Spinal cord injury classification of Decubitus ulcers.

Grade	Criteria
I	Limited to superficial epidermal and dermal layers.
II	Involving the epidermal and dermal layers and extending into the adipose tissue.
III	Extending through superficial structures down to and including muscle.
IV	Destruction of all soft tissue structures down to bone; there is communication with either bone or joint structures or both tissues may be affected.

ETIOLOGY

The ulcer is caused by constant pressure on the certain part of the body because it results into ischemia in that part. It is reported that in normal individual the osmotic pressure of the capillaries is found to be 32 mm. of Hg pressure, in mid capillary area 20 mm. of Hg, & in the venous limb 12 mm. of Hg. The mean pressure of a hard flat surface over the ischial tuberosities was greater than 300 mm. of Hg & on a hard contoured surface it reaches as high as 700 mm. of Hg. It was

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also found that with the addition of a two inch foam rubber cushion the ischial pressure dropped to 160 mm. of Hg, still far above the capillary blood pressure.

Heat contributes to the cellular metabolic deficiency by increasing the metabolic rate thus increasing the demand for oxygen which may already be compromised.

An increase in moisture, as a result of perspiration & incontinence of urine or faeces, reduce the resistance of the skin, contributing greatly to the risk of development of necrosis & ulceration.

Friction injury with resultant loss of epidermal protection predisposes to infection, oedema & increased moisture by itself, these factors will not destroy the dermis or deeper structures.

The shearing force that occurs when the head of the bed is raised 30 degree or more or if the patient is sitting at a reclining angle, as in a reclining wheel chair, results in an angular force and comprehension between the supporting surface and the skin over the sacrum. This shearing force angulates and stretches these vessels with resulting thrombosis and subsequent ischaemic necrosis.

Hygiene is important in decreasing the bacterial population of the skin, since invitable decubitus follows a threatened decubitus rapidly if infection occurs.

Poor general nutrition is, of course, frequently associated with chronic illness. The marked loss of weight which so often occurs, in addition to the muscles atrophy often present, results in a substantial reduction in the subcutaneous fat and muscle bulk which reduced the mechanical padding between the skin and underlying bone. The specific nutritional deficiencies hypoproteinemia and avitaminosis, specially ascorbic acid, interfere with the maintenance of normal tissue integrity. A negative Nitrogen balance commonly follows, pre-disposing to edema of dependent parts, decreasing the elasticity, resilience and vitality of the skin, and making more succeptible to minor injury. The development of oedema also promotes the pressure of other physical factors viz. heat & moisture. Healing will not occur when the patient is in negative balance. Since the rate of diffusion of Oxygen & metabolites from the capillaries to the cell decreases in proportion to the distance from the capillary to the cell. It is clear that oedema will have a profound effect on cellular survival or proliferation.

Anaemia or anorexia, with resulting reduction in delivery of oxygen to the cell, will further embarrass cellular metabolism & tissue necrosis will become more imminent.

An added factor, anesthesia, is present in patient with sensory loss in the more vulnerable areas. The paraplegic, has lost the 'warning pain' of discomfort from prolonged pressure. Motor stimuli to muscle is lost with the inability to change body position, with this loss of muscles contraction, disuse atrophy occurs & venous blood flow is slowed with resultant thrombosis and a decreased oxygen level. In the patient with spasticity, threatened decubitus as result of friction injury are common.

PREVENTION

The prevention of decubitus ulcer is the ultimate goal in all instances but is extremely difficult to achieve. The major portion of the programme is delegated to the nursing services. The task of prevention is great, but the reward is many time the effort & is tribute to good nursing care. Wound must be clean, soft, dry & smooth. The patient is turned frequently, preferably every two hours or less, with constant effort being made to distribute the body weight over as much area as possible in order to lessen the pressure on any one localised area. The position in bed should be observed frequently & the head end of the bed should not be elevated over 30 degrees for any significant period of time to obviate the danger of the shearing force factor. Alternating pressure mattresses are desirable in certain instances but often lead to false security & increased heat.

The skin is frequently inspected and as soon as possible the patient is taught to check his own skin with a mirror for redness or other evidence of the threatened decubitus ulcer.

Urinary & faecal incontinence must be controlled because urea splitting organisms lead

to, rapid skin breakdown. In the early stages, indwelling foley's cathetor may be employed. The bowels are controlled by the use of Biscodyl.

The importance of nutrition, a high protein, high vitamin diet is necessary and in some cases a protein & vit. supplement must be added. It is extremely important to mobilise the patient on the tilt table, wheelchair, crutches, braces and to institute an early active physical programme. This has a desirable effect on the appetite, venous flow & moral. Recreational & occupational therapy programme are encouraged to improve exercise tolerances and to increase the general activity level of the patient.

Correct wheelchair prescription and utilisation must not be overlooked, since the greater portion of the quadriplegics or paraplegics time will be spent in the wheelchair. Footrests must be adjusted to a height that distributes the weight over the posterior thigh as well as the ischial area. When footrests are too high than a greater portion of the weight being shifted to ischial tuberosity. The seat must be covered with four inches of foam rubber.

TREATMENT

Most patients with spinal cord injuries admitted to the rehabilitation centre, especially those injured many months prior to their admission present with ulcers in varying degrees or severity. The most common site is the ischial tuberosity in addition, anaemia & malnutrition are frequently present. The treatment programme is essentially the same as that in prevention.

Pressure over the ulcerated area is eliminated completely and dead tissue is debrided manually, the area is dressed with a light coat of streptokinase-stretodornase with strile dressing. If area is large it is often necessary for it to be packed with furacin or normal saline dressing. By using this technique we have been able to keep the wound free of necrotic tissue and infection.

Nutrition plays an important role. As much as 50 Gms. of protien is lost daily from a large open decubitus. A positive Nitrogen balance and Haemoglobin of at least 12 Gramm %, with the replacement of this by fresh transfusion, we can demonstrate the immediate healing response in the ulcerated area. High protein foods with iron, vitamin supplements are indicated since whole blood administration gives only transient benefit, if oral intake is not maintained at a satisfactory level.

Infections in other areas, specially UTI, must be treated vigorously otherewise lead to chronicity. Increase in spasticity may multiply the decubitus problems.

Systemic antibiotics are widely used in the treatment of decubiters ulcer. 70% of open wounds harbor hemolytic staphylococcus aureus, as well as many other organism of varying virulence and resistance. The dead tissue, serum, exposed tendon, fascia & tissue fluid provide excellent culture media for mixed infections.

Topical preparations have been recommended some time for the treatment of the decubitus ulcer. These are pyruvic acid, starch, salicylic acid, Daken's solution, cod liver oil ointment, gention- violet, acetic acid, boric acid, vitamin-C paste, granulated sugar & Gelfoam to mention only a few. Our experience with any of these agents is limited & no attempt will be made to discuss the merits of any particular topical agents.

The surgical treatment of the decubitus ulcer has been established and well outlined by many authors. Our experience leads us to believe that if surgery is indicated it must be of fairly radical in nature, involving removal of the ulcer & sufficient surrounding tissue, infected bursae & underlying bone. The technique of excision and grafting is beyond the scope of this discussion.

Paul et al (1960) have investigated the use of ultra sound as an additional therapy for this most vexing problem ultrasound was applied with a moving sound head with either oil coupling or under water.

Dose – 1 Watt/Sq. cm./Water coupling
1/2 Watt/Sp. cm./oil coupling

Treatment should be given three times in a week for a total six per series upto 3 series given with rest period time 2 weeks in between. As a result of U.S. treatment the necrotic material at the base of the ulcer had completly disappeared & the base of the ulcer was completly pink & healthy in appearance as was the surrounding skin.

Use of Gold leaf Treatment in Pressure Sore

Gold leaf is available commercially in two forms either with or without an adherent packing

of tissue paper. On the Ist day of treatment the lesion was scrubbed with a detergent solution and all crusted material was removed. After saturation with 95% C2H5OH the exposed tissue was then covered with four to eight layers of ordinary gold leaf follwed by a light non-sticking dressing which served as a protective covering during activities. Next day the crumbling gold leaf was removed with the aid of Normal Saline rinsing, after wards the ulcer was again prepared with alcohol & new layers of gold leaf were applied. Regeneration proceeded inward from the margins gradually covering the unchanged ligaments base.

Electrotherapy has also been tried. Locally applied tetanising currents (trains of biphasic, charge balanced current stimuli with the frequency of 40 Hz and amplitude below the visible muscle contraction) was tried and it showed significant improvement in healing.

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