Indian Journal of
Physical Medicine and Rehabilitation

IJPMR 1993 October; Volume 6 Number 2

CONTENTS

Print Edition

Editor:

Dr U Singh

ISSN

0973-2209

IJPMR 6 (2) Oct. 1993

Rehabilitation After Anterior Cruciate Ligament Reconstruction By Autograft

U.C. Sarma, K. Mittal, S. Bali

Abstract

Anterior Cruciate Ligament reconstruction was done by vascularised Patellar tendon graft as per the technique described by Noyes et al an McIntosh. The period of rehabilitation was divided into four stages - Stage-I- immobilisation, Stage-II- Mobilisation of the knee joint, Stage-III, gradual activity and Stage-IV Normal activity. Strenuous activity was allowed after one year. There were 17 excellent, 8 good, 2 fair and 3 poor results. Two had graft failure and one had partial stiffness of the knee joint. Subjectively, only one patient had recurrence of symptoms following rupture of the graft. Twenty eight patients were satisfied with the functional results.

Introduction

The cruciate ligaments are often damaged as part of complex injury of the knee joint or as an isolated injury. The disability following cruciate ligament injuries is dependent upon the amount of instability it produces. A multiple ligament injury is bound to produce severe instability. But an isolated injury of cruciate ligament is not severely unstable at the time of injury. However, as time passes, other structure providing anteroposterior stability becomes lax and a progressive instability occurs. Therefore, any cruciate ligament injury whether isolated or associated with other ligament and capsule injuries should be repaired. The ligament is successfully repaired if either of the two attachments are torn. The results of repair of midsubstance tear has been poor. They require augmentation of the repair with some living tissue i.e. patellar tendon, fascia lata or a prosthetic ligament. One may choose to reconstruct these tears primarily. The other group that require reconstruction is the one which has been diagnosed late, following arthroscopy/ Arthrotomy for increasing discomfort in the knee joint or a meniscus injury. In these cases the cruciate ligament stumps are absorbed, thus making the repair impossible. Till recently reconstruction of the cruciate ligaments was a frustrating affair. The range of movement often does not return to normal, thereby, denying the patient the advantage of a successful repair. The reconstruction itself may fail usually by rupture of the reconstructed ligament. In the recent years there has been changes in the understanding of the healing of the reconstructed ligaments promising these active, young and otherwise healthy patients return of the previous level of activity enabling them to go for competitive sport and other strenuous

U.C. Sarma, M.S. (Orth.), Addl. Professor Orthopaedics, K. Mittal, Physiotherapist, S. Bali, Physiotherapist, Dept. of Orthopaedics All india Institute of Medical Sciences N. Delhi 29

Correspondence :- Dr. U.C. Sarma, Dept of Orthopaedics, AIIMS, New Delhi 110029

TABLE I - MODE OF INJURY

CAUSE	NO. OF PATIENTS
Sports & Atheletics	7
Road Traffic Accidents	12
Construction site accidents	6
Incidental fall	5
Total	30

activity.

Material and Methods

We have so far operated 30 patients with old cruciate ligament injury who did not get their ligaments repaired at the time of initial injury for one reason or the other. There were only 2 females in the series. The age ranged from 18 to 45 years, with an average of 28 years. The mode of injury has been shown in Table I, the majority being road traffic accidents rather than sports injuries. There were 5 sportsmen in the series and sustained the injury while playing. All others were active young people with hectic life, 3 of them are recruits in the armed forces who had to undergo hectic physical training. All These patients were symptomatic and complained of the knee giving way either on walking on smooth surface or attempted running. The isolated cruciate ligaments injuries, though they had clinical evidence of varying degree, they complained of discomfort and occasional pain while walking or running. They were not grossly incapacitated.

After clinical examination, a routine radiograph was obtained to exclude any bony injury and avulsion of the either ends of cruciate ligaments. The cases with gross osteoarthritis were excluded, though there were 4 cases with minor O.A. changes in the series. The radiograph also gave the idea as to length of the patellar tendon available and the length of the graft required.

TABLE II - ASSOCIATED INJURY

INJURY	NO. OF PATIENTS
Medial meniscus	12
Lateral meniscus	9
Both menisci	3
Posterior cruciate ligament	7
Medial collat.. Ligament	3
Lateral collat. Ligament	2
Fracture lateral condyle	1

A preliminary arthroscopy was done in all the cases to confirm the diagnosis and to look for additional injuries i.e. meniscus injury and intramuscular injuries. The list of associated injuries are shown in Table II. There were 3 cases who had tear of both menisci. The injury to the collateral ligaments were not very marked so as to require a reconstruction of these ligaments. Anterior cruciate ligament was reconstructed with autograft using medial one third of vascularised patellar tendon[12] the upper end being fixed by 'over the top' technique with modification as suggested by W Muller (1983).

REHABILITATION & PHYSIOTHERAPY PROTOCOL :-

The period of rehabilitation and physiotherapy is divided into 4 stages and is stretched over a period of one year. The aim is to protect the graft when it is weak without loosing knee movement and then gradually condition the graft so as to make it able to withstand the stress and strain of contact sports.

TABLE III- SCHEME OF REHABILITATION

Stage I-4 to 6 weeks (In P.O.P. Cylinder)

1. Static Quadriceps & hamstring muscle exercise
2. Straight leg raising exercises
3. Non weight bearing crutch walking
4. Electrical stimulation (occasional)

Stage II - upto 3 months (range of motion)

1. Range of motion exercise
2. Static quadricps & hamstrings muscles exercise
3. Straight leg raising exercises.
4. Non weight bearing crutchwalking.
5. Electrical stimulation.

Stage III - upto one year (Gradual activity)

1. Gradual weight bearing
2. Range of motion exercises.
3. Static and resisted quadriceps exercises.
4. Bicycling, rowing, kneeling, prone lying exercises.
5. Jogging (6 months onward)

Stage IV - Beyond one year (Normal activity)

1. Graduated sporting activity
2. Static & resisted quadriceps exercises.

STAGE -I : This is spread over a period from the day of operation till about 4 to 6 wks. Here the graft is protected in P.O.P. cylinder at about 45 degrees flexion of the knee joint. The aim is to keep the quadriceps and the hamstrings active.

Weight bearing is not allowed during this stage (Table III).

STAGE -II : The aim is to gain the range of motion of the knee joint and the strength of the muscles. It extends upto about three months after operation. As the graft is still weak, it still needs protection. Hence weight bearing is not allowed (Table III).

STAGE - III : The next 9 months (i.e. 3 months to one year post operative) is conditioning of the graft by allowing graduated activities of daily living. This also includes gain of range of motion if the recovery is not complete in stage II using more strenuous exercises i.e. kneeling squatting or slings and further gain in muscle power by use of isotonic exercise. (Table III).

STAGE - IV : After one year the patient is exposed to more severe stress by graduated return to strenuous physical activity or contact sports. (Table III).

Results

The results of the procedure were assessed periodically on the basis of OAK (Orthopaedic study group of the knee of the Swiss Orthopaedic Society[14], knee evaluation score. They were also assessed subjectively with regard to patients assessment of the results and their ability to go back to previous level of activity. Some patients had undergone arthroscopy for further evaluation of the status of the reconstructed ligaments. The period of follow up ranged from 1 to 6 years.

The knee score before operation ranged between 40 to 60 with missing points. Following reconstruction it improved with a gain of 30 to 50 points. There were 17 excellent, 8 good, 2 fair and 3 poor results as per the scoring. The score attained at the end of 1 year did not deteriorate significantly in subsequent follow ups and suggesting that there were no deterioration of the results after one year.

The knee giving way which was present in 25 cases, disappeared in all cases after reconstruction except the one who had graft failure and did not agree for reparation. He also had positive pivot shift. Anterior stability had significantly improved. In Lachman test the anterior displacement of tibia was less than 5mm in 22 cases, 5 mm in 6 cases and more than 5 mm in 2 cases. On the other hand drawers test showed 5 mm to 10 mm displacement of tibia in 25 cases,

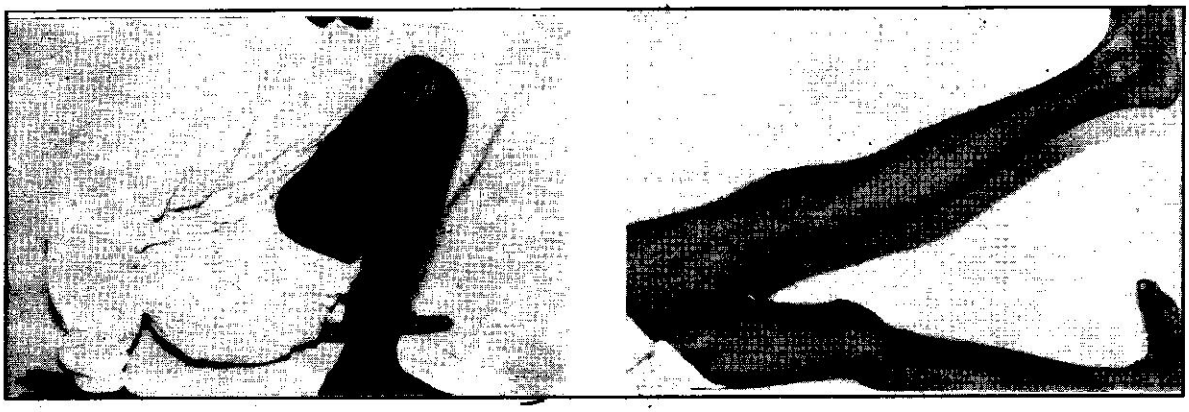

FIG. 1. Photograph showing recovery of full function with reasonable size of quadriceps muscle after ACL reconstruction and reinforcement of posterolateral complex. (From Ind. J. Orthop' 91 July, pp 108)

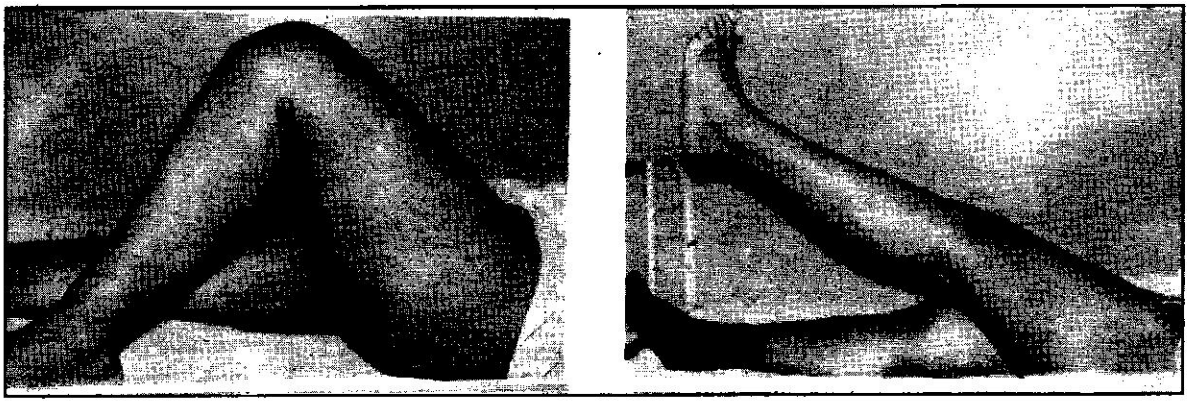

FIG. 2. Photograph showing incomplete recovery of the knee range of motion following reconstruction of ACL and repair of MCL. Note the size of quadriceps muscle.

thus suggesting that the knees were more stable in extension than in flexion. The range of motion was regained in almost all the cases except one who had flexion of 0 to 120 degrees. Limitation of the last 5 degrees of extension was seen in 8 cases where as 12 had limitation of last 5 degrees of flexion. Quadriceps muscle wasting was present in all the cases and ranged from 2 to 3.5 cm.

The recovery of the preinjury functional status is quite encouraging. Three of the 5 sportsmen have gone back to sports though none has gone back to competitive sports. The other two gave up sports because they got some others means of livelihood. There were 8 heavy manual workers, they all have gone back to their previous work. For the sedentary workers i.e. remaining 17 which includes two housewives, the operation has been satisfactory and have been able to run and jog.

Five patients have undergone arthroscopy at 3 to 4 years after operation. The ligament was found intact with usual attachments. Medial meniscus degeneration was observed in 2 cases. The menisci which were excised (Partial meniscectomy) have regenerated, however, they do not look as smooth as the

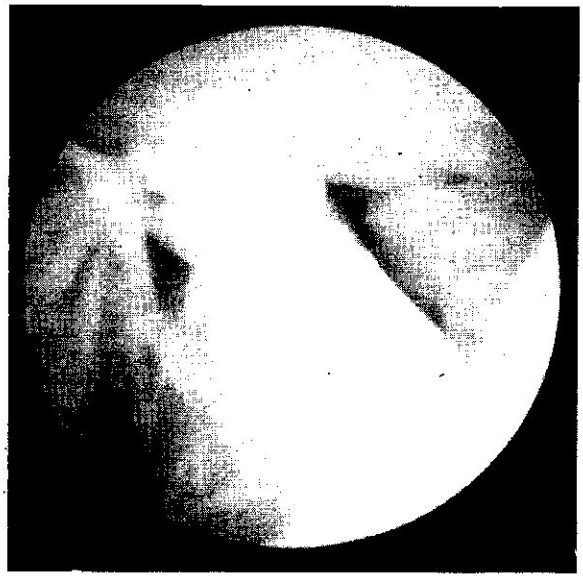

FIG. 3.

Arthroscopic view of the reconstructed anterior cruciate ligament at 3 years post operative.

normal menisci.

There were 3 poor results. Two of them had graft failure. One of them had refused any further intervention and the other whose knee was reexplored, the ligament could be sutured back. She had fair result. The third patient with poor result was due to a malunited lateral condyle fracture of tibia. One of patients with fair results had mild osteoarthritis and had more than 5 mm anterior instability of tibia. This instability was probably because of inadequate tension to the neoligament while fixing it. The other fair result was because of failure to gain the range of movement beyond 120 degrees of flexion, though the knee was otherwise stable.

Discussion

There are three elements in the rehabilitation of patients of ACL reconstruction with autograft - 1) protection of the graft until it matures, 2) gain of range of motion and 3) preservation of quadriceps muscle.

The graft which is selected for this purpose is usually more than one and a half times stronger than ACL. Graft looses strength by about 50% immediately after reconstruction[12] In such circumstances the graft if exposed to the stress and strain of weight bearing will rupture. The gain of strength follows revascularisation of the neoligament, the vessels being derived from the neighbouring tissues[1] and the remodeling of the collagen fibre bundles in its substance[3] The remodeling has been observed in human beings as well[4,8] and has been estimated to take 12 to 18 months. It is presumed that by about 3 months the graft can withstand the stress and strain of normal walking. Sporting activity is only to be started after one year. The rupture of the graft occurs mostly during the first 3 months and usually results from overzealous physiotherapy, or failure on the part of the patient to adhere to the rehabilitation protocol. The 2 cases in our series who had rupture of the graft occurred during the first 3 months in the past stiffness of the knee joint had nullified the benefits of most of the reconstructions. This has been overcome by a change in the surgical technique and proper timing of the exercises. While reconstructing the ligament, the patella should not be dislocated and the suprapatellar pouch should not be disturbed. In our series, the cases where patella was dislocated,

The gain of range of motion was slow. One of them did not gain full range of motion. Full extension of the knee joint may not be achieved. This may be the result of quadriceps lag or impingement of the graft in the anterior margin of intercondylar notch. The impingement has been overcome by addition of notchplasty to the procedure. The failure to gain full range of movement can occur if the graft placement is not isometric. This may also result in rupture of the graft as the reconstructed ligament cannot stretch more than 2 mm during the range of motion.

The quadriceps muscle wasting is part of all knee injuries. All the patients treated by

us had quadriceps wasting. It has been observed that this muscle starts wasting within a week of the injury. Electrical stimulation of the muscle reduces the muscle atrophy specially in females.[2] All but 2 of our cases were males. The first 5 cases had undergone electrical stimulation. Later on this was abandoned as most of the patients were able to regain the power only by isometric and isotonic exercises. Electrical Stimulation was useful only in those cases who had a prolonged inhibition of the quadriceps muscle. The effect of immobilisation on the quadriceps muscle wasting has been studied. The muscle wasting was more if the knee was immobilised in 10 to 15 degrees of flexion[5,6] On the other hand if the knee joint is flexed to about 40 to 45 degrees thus putting the quadriceps muscle under stress the atrophy is minimum[2,7] Thus for prevention of quadriceps wasting not only isometric exercises are essential, the position of immobilisation also plays a significant role in this. All our cases were immobilised at 30 to 45 degrees of flexion of the knee joint.

A reasonable functional recovery can be expected following anterior cruciate ligament reconstruction provided these patients after surgery are rehabilitated adequately following a time schedule which matches the graft uptake and maturation process. The modification of surgical technique has also enhanced the results to a great extent. Once The crucial phase of failure of the graft is over, the results do not deteriorate with time.

References

1. Arnoczky SP, Dipl DVM, Tarrin GB, Dipl ACVS, Marshal JL (1982) : Anterior cruciate ligament replacement using patellar tendon. J. Bone Joint Surg. 64A : 217 - 234.
2. Arvidsson I, Arvidsson H, Eriksson E, Jansson E: (1986) Prevention of quadriceps wasting after immobilisation - our evaluation of electrical stimulation. Orthopaedics 9:1519-1528.
3. Ballock RT, Woo SL, Lyon RM, Hollis, Akwaon WH : (1989) Use of patellar tendon allograft for anterior cruciate ligament reconstruction in the rabbit: long term histological and biomechanical study. J. orthop. Orthop. Res. 7(4) : 474-485.
4. Clancy WG, Roy JM : (1987) Anterior cruciate ligament autografts in the anterior cruciate deficient knee, edited by Jackson DW & Dreg D.C. CV Mosby, 193-210.
5. Haggmark T, Eriksson E : (1979) Cylinder or mobile cast brace after ligament surgery. Am. J. Sports Med 7:48-56.
6. Haggmark T, Jansson E, Eriksson E: (1981) Fibre type area and metabolic potential of the thigh muscle in man after knee surgery and immobilisation - Int. J Sports Med. 2, 12-17.
7. Halkjaer-Krishtensen J, Ingemann-Hassen T: (1985) Wasting of human quadriceps muscle after knee ligament injuries. Scand. J. Rehab. Med. Suppl. 13:5-20.
8. Jenkin DHR (1985) Injuries and their treatment. Chapman and Hall, London 189-206.
9. McIntosh DL and Tregonning RJA : (1977) A follow up study and evaluation of "Over the Top" repair of acute tears of anterior cruciate ligament. J. Bone Joint Surg. 59B : 511
10. Muller W : (1983) The knee; Form, Function, and Ligament Reconstruction : Sprionger-Verlag, Berlin 8-27:221-264.
11. Muller W, Biedert R, Hefti F, Jakob RP, Munzinger U. Staubli. HU : (1988) OAK knee evaluation : A new way to assess knee ligament injuries. Clin. Orthop. 232 : 37-50.
12. Noyes FR, Buter DL, Paulos LE, Grood ES: (1983) Intraarticular cruciate Reconstruction I. Perspective on graft strength, vascularisation and immediate motion after replacement. Clin. Orthop. 172:71-77.

IJPMR 6 (2) Oct. 1993

Cerebral Palsy In Children Can Be Prevented

Ramar S

Abstract

3702 cases of Cerebral palsy reported to Tirunelveli Medical College Hospital during 1978 to 1988 were analysed with special reference to preventable causes of Cerebral palsy. Antenatal, perinatal and postnatal history; clinical assay for early detection of cerebral palsy; and clinical profile regarding topographical distribution, pathological typing and associated disabilities were evaluated. The study revealed that postnatal acquired causes constitute the major causes for Cerebral palsy viz., encephalitis (49.3% in the inpatient series & 42.06% in the outpatient series). and tuberculous meningitis (44.28% in the inpatient series & 32.71% in the out patient series). This study stresses the need to modify & correct Health Care Delivery system so that the major causes of cerebral palsy in this part of the country viz., encephalitis and tuberculous meningitis can be totally prevented.

KEY WORDS : Cerebral palsy; Tuberculous meningitis; encephalitis.

Introduction

Cerebral palsy is a disorder of movement and posture due to a nonprogressive lesion in an immature brain. It may be associated with other disabilities viz., mental subnormality, hyperkinetic activity, defective hearing/speech and seizures. The Cerebral palsy dysfunction occurs as a result of insult to the brain during antenatal, perinatal, and postnatal period. The prevalence of Cerebral palsy in India is 2.6% with deformity & 15.2 with paralysis in rural population and 3.2% with deformity & 9.9 with paralysis in urban population among the locomotor handicapped. Cerebral palsy is the second commonest cause of childhood disability. Among the causes for Cerebral palsy, postnatal causes can be totally prevented, perinatal causes can be eliminated by effective application of available advanced medical technology and the incidence of antenatal causes can be reduced by good antenatal care.

Methodology

Children with motor development delay reported to the Outpatient services of Department of Physical Medicine & Rehabilitation during 1981 to 1988 and Inpatient Departments of Tirunelveli Medical College Hospital during the years 1978-1987 were evaluated for evidence of Cerebral palsy. Clinical assay for early detection of Cerebral palsy was evolved and used for this study. Antenatal, perinatal and postnatal history; topographical distribution; pathological typing and associated disabilities were analysed.

Clinical assay for early detection of cerebral palsy:

(1) At birth :- Cerebral palsy is rarely diagnosed at birth and there should be an index of suspicion of cerebral palsy in all cases with poor antenatal & perinatal history, Rh incompatibility (or) ABO incompatibility and prematurity.

(2) Birth to 4 weeks:- Presence of lethargy (or) drowsiness, feeding difficulties, icterus neonatorum and neonatal seizures.

(3) At 4 Weeks :- Presence of hypotonia, poverty of movements during Moro's reflex and tonic neck reflex.

(4) At 8 Weeks :- Presence of nystagmus, lack of fixation of eye over moving objects, lack of facial expression, absence of smile & frowning, persistent head rolling and opisthotonus.

(5) At 16 Weeks :- Presence of head lag,

Ramar S, M.N.A.M.S. (P.M.& R) Physiatrist and Assistant Professor, Department of Physical Medicine and Rehabilitation, Tirunelveli Medical College Hospital, Tirunelveli-Tamilnadu - India 627 011
Correspondence :- Dr. S. Ramar, 32, Perumal Sannathi Street, Tirunelveli Junction, Tamilnadu - INDIA - 627 001.

persistent strabismus, absent (or) reduced vocalization (or) laughter, lack of attention span, hand closed over thumb and persistent Moro's reflex.
(6) At 32 Weeks :- Presence of persistent Tonic neck reflex, head leg, absent prone lying, random automatic movements, adduction of legs during sitting and kicking both feel in extension.
(7) At 48 Weeks :- Presence of persistent plantar grasp, preference for using only one hand, left handedness without family history and bottom shuffle.
(8) Presence of primitive reflexes, and absence of righting reactions & protective phenomena.
(9) Presence of hydrocephalus, asymmetrical Moro's reflex, asymmetrical parachute reaction, involuntary mass movement and increase of tone on change of position and hypotonia.

Results

In the Inpatient series, encephalitis constitutes 1667 cases (49.3%), tuberculous meningitis, 1497 cases (44.28%) Fig. 1 and others including antenatal and perinatal causes 217 (6.4%). In the Outpatient series, encephalitis constitutes 135 cases (42.06%); tuberculous meningitis, 105 cases (32.71%); antenatal causes, 6 cases (1.86%) and perinatal causes, 75 (23.31%) thus in Inpatient and Outpatient series, both encephalitis and tuberculous meningitis constitute the major causes of Cerebral palsy.

Review of the predisposing factors showed that there was a general trend of reduction in induced abortion, threatened abortion, preeclamptic toxaemia and prolonged labour. But the incidence of antepartum haemorrhage and asphyxia neonatorum did not show any evidence of reduction. However prematurity showed definite evidence of increase in its incidence (Table 1).

Discussion

In the study the major causes of Cerebral palsy is postnatally acquired encephalitis & tuberculous meningitis ie., 93.58% in the inpatient series and 74.76% in the outpatient series. Review of Indian literature also supports increased prevalence of these diseases. [2,3,4,5] The prevalence of tuberculous infection is about 40% in all age groups and the risk of infection is about 2-4% per annum. It only indicates lack of BCG vaccination in a susceptible population. Japanese encephalitis is transmitted from the animal host viz., pig to mosquitoe culcine. After an incubation period of 9-12 days the virus is transmitted to man to exhibit encephalitis. Japanese encephalitis was first recognised in 1955 at Tamilnadu in India The survey done by the National Institute of Virology, Pune documented that about 50% of the population of South India

Table - 1
Predisposing Factors in Cerebral palsy

Nature of Illness	Incidence - Number of cases									
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Induced Abortion	1225	1320	1205	1197	1469	501	287	142	58	148
Threatened Abortion	74	58	43	31	40	51	37	26	21	35
Pre Eclamptic Toxemia	168	141	64	50	13	28	25	37	22	9
Prolonged Labour	56	18	7	19	7	8	29	5	8	0
Antepartum Haemorrhage	22	13	45	28	24	30	12	22	40	30
Asphyxia Neonatorum	70	50	17	35	18	14	29	48	68	58
Pre-Maturity	43	48	35	44	86	30	60	133	93	133

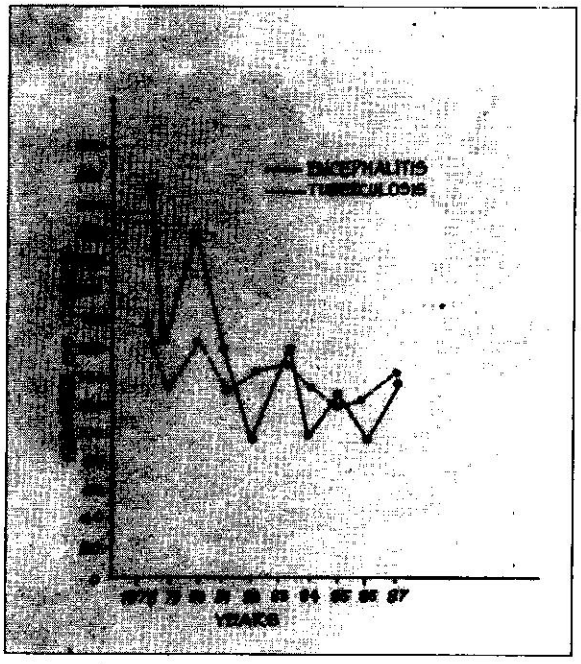

FIG. 1.

Incidence of tuberculous meningitis and encephalitis as a cause for Cerebral palsy from 1978 to 1987.

have neutralising antibodies to this virus. Japanese encephalitis can be controlled by vector control by (1) aerial (or) ground bogging in the ultra low volume insecticide malathion (or) fenitrothion and (2) vaccination of population at risk using two doses of killed mouse brain vaccine each 1 ml (or) 0.5 ml for children below 3 years at the interval of 1-2 weeks with a booster dose after a month and revaccination after 3 years.

It is very much contrasting to note from the Western world that preventive measures are totally exploited to prevent the postnatal preventable causes of Cerebral palsy with a resultant negligible number of children with Cerebral palsy due to postnatal causes. The perinatal cases for Cerebral palsy constitute only smaller percentage similar to Western countries. Suprisingly the antenatal causes for Cerebral palsy forms the negligible number in this study. But it still remains as the unsolvable causes for Cerebral palsy.

Conclusions

This study documents the need for active modification & correction of health care delivery system to prevent the totally preventable causes of Cerebral palsy viz., encephalitis and tuberculous meningitss etc., by effective immunisation programme.

The study also emphasises the growing need to train man power to apply the advanced medical technology. This study emphasizes the need to undertake research work to prevent the unsolved causes of Cerebral palsy.

References

1) Disability Statistics Compendium : Statistics on special population groups. New York : United Nations, 1990, Series Y No. 4.

2) Basu B. Cerebral palsy in childhood. J Ind Med Assoc 1967; 49: 477-482.

3) Garg B K Srivastava, J.R. Cerebral palsy a clinical study of 124 cases with a review. Ind Paed 1965; 2: 195-208.

4. Udani P M. Cerebral palsy a study of 100 cases. Ind J H1th 1963; 12:755-770.

5) Mukerjee A et al. Cerebral palsy in children. Ind J Paed 1971; 38:219-222.

6) Park J E, Park K, Epidemiology of communicable disease. In : Text Book of Preventive and Social Medicine. 11th ed. Jabalpur : M/s Banarsidas Bhanot, 1991: 155-234.

7) Edward M Brett. Cerebral palsy, Perinatal Injury to the spinal cord and Brachial plexus birth Injury. In : Paediatric Neurology. Ist ed. New york: Churchill Livingstone, 1983, 245-247.

8) Mitchell R G. Prevention of Cerebral palsy. Dev. Med. Child Neurol, 1971;13:137-146.

IJPMR 6 (2) Oct. 1993

Lumbosacral Radiculopathy Conservative Management Outcome in 80 consecutive patients

Dr. Bashir, A. Buth

Abstract

Eighty (80) patients with Lumbosacral Radiculopathy were treated conservatively. The patients were followed up for a period of three years (1986-1989). Out of 80 patients, only 8 (10%) had undergone surgery. The Conservative management included, complete bed rest for a period of 2-3 weeks, with use of antiinflammatory medication, and Lumbosacral support. Repeated clinical evaluation indicated significant improvement in nearly 90% of patients. It is concluded that surgery is rarely indicated in Lumbosacral Radiculopathy.

Introduction

The patients with Lumbosacral Radiculopathy occupy a large part of time in Physical Therapy Department. The management of the lumbosacral radiculopathy secondary of disc disease is controversial[1,3,5] and the influence of Physiotherapy on speed of recovery and out-come is uncertain[2].

A wide range of therapeutic measures have been used but do not seem to confer any long term benefit. There is a general agreement that conservative treatment, which may include bed rest, analgesic medication, exercises and education has a favourable outcome in a majority of cases.[6] Surgery is indicated in only a small percentage of cases[8,9] and delaying surgery is appropriate in most patients[9].

The aim of this study was to evaluate the outcome of conservative treatment in patients of lumbosacral radiculopathy.

Correspondence :- Dr. Bashir, A. Buth, M.D., D. Phys. Med. Associate Professor & Head, Physical Medicine & Rehabilitation, Institute of Medical Sciences, Srinagar, Kashmir

Patients & Diagnosis :

Eighty (80) patients with Back Pain were studied. The Lumbosacral Radiculopathy was considered in patients with history of Back Pain, worsened with coughing, sitting and often radiating down the leg.

The pain was poorly localized and deep in myotomal or dermatomal pattern.

Most of the patients had past history of Back-ache or lumbosacral sprain. All the patients had gross paravertebral spasm and spinal movements were markedly restricted espacially the lateral flexion on the affected side.

The patients with hip and sacroiliac arthritis, ischial bursits, Coccydynia, thrombophlebitis, intermittant claudication, malignant or infective disease, Gynacacological disorders, vertebral collapse, and gross structural abnormality of spine were excluded from this study.

The clinical finding of these patients are shown in Tables I & II.

Table - I
History of Patients with Lumbosacral Radiculopathy.

History		No. of Patients
A)	No. of episodes of Radiculopathy.	
	1.	60
	2.	12
	3.	8
B)	Precipitating factors	
	Not identified	12
	Heavy lifting	40
	Pushing /Pulling	15
	Sports activity	6
	Auto accidents	7
C)	Location of Pain	
	Back and gluteal region	70
	Post. thigh	15
	Leg	50
	Foot	20

The number of patients is more than 80, because patients had multiple areas of pain.

Lasegue's straight leg raising test[7] and Popliteal compression test was helpful in diagnosis and in follow up in these patients.

Management of Patients :

The patients were treated using the following principles of treatment.

1) Complete rest for 2-3 weeks
2) Anti-inflamatory medication
3) Exercise therepy and
4) Lumbosacral support.

The patients with acute onset (2-4 weeks) were advised complete bed rest, and Anti-inflammatory medication. The Physical measures advised during bed rest period were application of hot packs, cold packs (using ice) and infrared.

The following exercises programme[4] was designed after the patient was free from pain

In the first week of bed rest treatment, only knee to chest and pelvic tilt was advised. During the 2nd (or if the patient was not able to perform sit ups from level position) the patient was

Table - II
Physical Finding in 80 patients with Lumbosacral Radiculopathy.

Root	No of Patients	Reflexes	Sensory Changes	Weakness
L4	6	↓Knee	Antero-medial aspect of leg.	Grade 3-4 Quadriceps.
L5	40	-	Antero-lateral aspect of leg. Dorsal aspect of foot and great toe.	Grade 3-4 EHL.
L5, S1	24	↓AJ	Lateral aspect of leg. lateral border of sole. Lateral toes and great toe.	Grade. 3 extensors of toes.
S1	10	↓AJ	Postero-lateral aspect of leg. Lateral border of sole and lateral toes.	Planter flexors of foot.

instructed to begin from a sitting position and descend to supine position. Sit ups were done, in hook lying position taking 3 seconds for he sit ups, 3 seconds to hold, and 3 seconds to slowly descend.

The patients were instructed to begin with the sit ups they could perform comfortably and progress to 20 repetitions, twice daily. Then the patients were advanced to a slant board with three adjustments from 10°-30°. The patients who could perform 20 sit ups at 30° slant were allowed to place sand bags in padded fashion around the neck, and perform sit ups.

The next part of the treatment was a lumbosacral corset. The patients put on the corset in recumbent position, then rose. The corset is worn full time until 20 sit ups can be done, comfortably, usually 1½ to 2 months. Then corset is worn in the early afternoon. After the period of 4-6 months the corset is worn only during activities, like long drives, gardening, heavy works and sports activities.

The corset provides circumferential pressure, and limits the extremes of lumber movements, and a reminder not to abuse the back.

Results and Discussion

50 patients were symptom free and had started the light activities, withen 3 months from the beginning of the treatment. 15 of these patients had returned to light work, only after one month of the treatment.

Additional 22 patients who were pain free feared activity, for nearly 6 months, the back education helped them to overcome the fear.

The improvement in these patients was recorded by history of diminution of pain, increase in angle of straight leg raising and improvement in muscle power.

Only 8 patients had under gone surgery (laminectomy).

The majority of these patients were followed up for a period of 3 years, with some exceptions all these patients remained symptom free and active.

References

1) Borgesen S.E, Vang PS : Herniation of Lumber intervertebral disk in children and adolesents : Acta Orthop Scand 45, 540-549, 1974.

2) Coxhead CE, Inskip H, Meade TW, North WRS : Multicenter Trial of Physiotherapy in the management of sciatic syndrome. The Lancet Saturday 16 May 1981.

3). Kuhns J G : Consdervative treatment of sciatic pain in Low Back disability. J. Bone Joint Surg. 23, 435-443, 1941.

4) Cailliet R. Low Back Pain Syndrome. Philadelphia, Davis, 1962.

5) Pearce J, Moll JMH : Conservative treatment and natural history of Acute Lumbo disc lesions J. Neurol Neurosurg Psychiatry, 30, 13-17, 1967.

6) Johnson EW, Fletcher FR Lumbo Sacral Radiculopathy Review of 100 consecutive cases Arch Phys. Med. Rehabil. 62, July 1981.

7) Scham SM, Taylor TKF : Tension Signs in Lumber disc prolapse Clin Orthop, 75, 195-204, 1971.

8) Frymoyer JW, Pope MH, Clements JH, Wilder DG, Mac Pherson B, Ashikage T: Risk Factors in low back pain, an epidemiological Survey. J. Bone Joint Surg. (Am) 65-A, 213-8, 1983.

9) Anderson GJB, Svensson HO, Odew, A, The intensity of work recovery in Low Back Pain, Spine, 8, 880-4, 1983.

IJPMR 6 (2) Oct. 1993

Long Term Trial of Low Dose Methotrexate in Rheumatoid Arthritis

LT Col K Achuthan & GP Capt S K Dham , VSM

Introduction

Rheumatoid Arthritis (RA) is a disease characterised by chronic pain, development of multiple deformities and prolonged morbidity. Its management is a challenging job with patient compliance, availability of drugs, cost of medicines, ease of administration and side effects determining success of therapy. Sero-positive RA is a more aggressive disease characterised by erosions and development of deformities. In the final analyses deformities rather than the disease itself may cripple the patient. Hence, modern thinking revolves around early use of disease modifying anti rheumatic drugs (DMARD)[1, 2]. This along with active physiotherapy and joint protective measures ensure an optimum result.

Materials & Methods

To assess the efficacy, telerability and side effect profile of long term Methotrexate in RA, a study was conducted on 128 patients of RA satisfying the ARA criteria[3]. The study was of an open, controlled and non comparative design and the period of trial was 24 months. All patients were allowed to continue their usual non steroidal anti inflammatory drugs (NSAID) and those who were on steroids were allowed to continue, with the dose being gradually tapered off. All patients after informed consent were given 7.5 milligrams of tablet Methotrexate (MTX), per week, in an intermittent pulse regime[4]. A MTX chart was maintained by all patients from which the total dose of MTX as well as results of serial haemogram and Liver Function Tests (LFT) could be readily ascertained.

The admission criteria were fresh cases as well as old cases with failure to continue other DMARD for a minimum period of 3 months due to non effectiveness, non availability, cost factor or side effects Subjects with skin rashes, haematological, renal & hepatic diseases were excluded from the study.

The following clinical laboratory parameters were assessed at start of trial, after 3 months and then six monthly for a total of 24 months.

1. Functional class I, II, III & IV.
2. Subjective pain score as nil, mild, moderate and severe.
3. Duration of morning stiffness in minutes.
4. Objective tenderness score as nil, mild, moderate and severe.
5. Sum of proximal inter phalangeal (PIP) joint circumferance in centimeters.
6. Sum of hand grip strength in mm of Hg.
7. Global assessment of efficacy by doctor and patient on a 5 point scale.
8. ESR in mm at end of first hour and Complete blood counts once a month.
9. C-reactive protein (CRP) in mg/L.
10. Rheumatoid factor (latex) and Hepatic and renal biohemistry once a month.
11. Liver scan using Technitium^{99} at beginning of trial and once a year unless indicated by persisting abnormal hepatic biochemical values.

All subjects were strictly screened for efficacy and side effects and the results were analysed by (1) Student 't' test and (2) Wilcoxan signed rank test.

Correspondance :- LT Col K Achuthan & GP, Capt S K Dham, VSM, Dept of Rheumatology & Immunology, Army Hospital, Delhi Cantt - 110010.

Results :

There were 128 cases of RA with Male : Female ratio of 4:7. The mean age (in years) was 28.02 ± 8.6. The duration (in months) of RA was 6.72 ± 22.4 seventy six were fresh cases and 52 were previously in other DMARD of which 26 were on steroids. 93 cases were RF + ve and 35 were negative.

The results of ARA functional classification, subjective pain score and objective tenderness score are shown in Table I, II and III.

Table - I
Functional Classification
n = 128

Disability	Class	Pre		12 months		24 months	
Mild	I	18	(14%)	83	(64.8%)	106	(83%)
Mod	II	67	(52.4%)	212	(16.4%)	12	(9.4%)
Severe	III	37	(29%)	20	(15.6%)	8	(6.0%)
Incap	IV	6	(4.6%)	4	(3.2%)	2	(1.6%)

Table - II
Subjective Pain Score
n = 128

Degree	Pre		12 months		24 months	
Nil	Nil		46	(36%)	57	(44.5%)
Mild	48	(37.5%)	31	(24.2%)	54	(42.5%)
Mod	41	(32%)	30	(23.4%)	9	(7%)
Severe	39	(30.5%)	21	(16.4%)	8	(6%)

Table - III
Objective Tenderness score
n = 128

Degree	Pre		12 months		24 months	
Nil	Nil		47	(36.7%)	82	(64%)
Mild	42	(32.8%)	31	(24.3%)	21	(16%)
Mod	58	(45.4%)	35	(27.3%)	17	(14%)
Severe	28	(21.8%)	15	(11%)	8	(6%)

Table IV depicts the changes seen after 24 months from the basal values in the assessment of duration of morning stiffness, sum of PIP joint circumferance and grip strength. They were found to be statistically significant.

The changes in the relevant laboratory indices evaluated in this study are shown in Table V. The fall in ESR from 64.2 ± 6.0 to 29 ± 2 and reduction of CRP from 4.3 (0.6) to 1.8 (0.4) was statistically significant. Complete blood counts and renal biochemistry showed no significant changes during trial period. Insert

Out of the 93 RF positives cases 63 (67%) became RF Negative at the end of 24 months. Of the 26 cases on steroids 21 (80%) could be fully weaned off it, and even in the remaining 5 patients, the dose could be reduced significantly.

From the 128 patients 28 (21.8%) had side effects not warranting withdrawal and only 9 (7%) had to be withdrawn from the study. The reasons for withdrawal were :

3 due to interactable oral ulcers.
3 due to recurrent skin rashes
1 due to an abnormal liver scan at six Months.
1. due to persistently raised liver enzymes at 4 months
1. due to military tuberculosis at seven months.

Table - IV
Clinical Parameters
n = 128

Parameter	Pre	12 months	24 months	'p' Value
Duration of Morn Stiffness (MTS)	270 (18)	206 (22)	132 (36)	< 0.01
Sum of PIP Circumference	596 (514-683)	581 (536-612)	572 (502-652)	< 0.05
Sum of Grip Strength (mm/Hg)	228 (21)	241 (18)	296 (28)	< 0.01

Table - V
Laboratory Values
n = 128

Parameter	Pre	12 months	24 months	'P' Value
ESR (mm)	64.2 ± 6.0	38 ± 7	29 ± 2	0.01
Hb (gm/de)	9.4 ± 0.6	10.2± 0.3	12.2 ± 0.2	
Platelets(x1000/c.mm)	420 (27)	402 (22)	387 (25)	
CRP (mg/dl)	4.3 (0.6)	2.3 (0.7)	1.8 (0.4)	0.01

Table - VI
Side Effects

Nature	Severity			Total	
	Mild	Mod	Sev		
Nausea	2	0	0	2	
Vomiting	1	3	0	4	G.I.T.
Anorexia	3	2	0	5	14 (50%)
Oral Ulcer	3	0	0	3	
Pruritis	3	0	0	3	
Skin Rash	1	3	0	3	
Giddiness	2	0	0	4	
Abnormal Liver Enzymes	5	0	0	2	
				28 (21.8%)	

Table - VII
Global Assessment of Efficacy

Assessment by Doctor		Assessment by Patient		
Excellent	_	Very Much Improved	20	(16%)
Good	93 (73%)	Much Improved	82	(64%)
Adequate	29 (23%)	Improved	18	(14%)
Poor	6 (4%)	No Change/Worse	8	(6%)

Table VI depicts the other undesirable effects seen. It will be noted that 50% of the side effects were related to the Gastro intestinal system and were mild to moderate in severity and needed only symptomatic measures.

Table VII shows the results of global assessment by the doctor and patient.

Discussion :

Methotrexate (MTX), a folic acid antagonist was initially introduced in 1949 to treat acute leukaemias. It was soon found to have a potent inhibitory effect on collagen synthesis and thus found a place in the treatment of Psoriasis and Psoriatic arthritis. Based on this Gubner et al used it in 6 cases of RA more than 40 yrs ago with significant improvement in 5 cases. As there is considerable evidence to indicate that destruction in RA is immunologically mediated, drugs that are immunosuppressive should be of benefit in treating the disease. Since then studies done abroad and in India have established MTX as a DMARD of value in RA.[7,8,9] The exact mode of action of MTX is yet unclear, and whether it acts by an anti-inflammatory effect, an

immunosuppressive action or by inhibition of the rapidly proliferating synovial cells is not definite. However, in the low dose used in treating RA systemic immunosuppression has not been demonstrated.[8,9]

Functionally, whereas there were 18 (14%) in class I initially at the end of the trial 106 (83%) had moved into this class. In addition on analyses of the functional class there were 6 (4.5%) in class IV initially, leaving 2 (1.6%) at the end of 2 Yrs (Table I). Results of assessment of subjective and objective pain score paralleled the results above (Table II and III). Clinical assessment of duration of morning stiffness, sum of PIP circumferance and sum of grip strength showed a satisfactory response with their values being statistically significant at the end of 24 months (Table IV). It is important to note that no haematological or renal side effects were noted. However of the 128 subjects 9 had to be withdrawn from the trial and of these 3 case were considered to have developed serious side effects - 1 case with abnormal liver scan, 1 case with persistently abnormal liver enzymes raised more than three times the normal, and 1 case which developed miliary tuberculosis.

Of the mentioned side effects hepatic fibrosis/cirhosis is considered serious and this had led many to recommend serial liver biopsies after use of each 1.5 Grams of MTX.[10] However, many studies have demonstrated that hepatic toxity is very uncommon with the low intermittent dose of MTX used in RA.[9,11,12] Our study also confirms this finding and suggests that serial liver function test along with periodical liver scan is adequate to detect liver toxity[13] and liver biopsy is not considered necessary.

The number of withdrawl from our study more or less corresponds with that seen in other studies [8,15]

Of the other side effects (Table IV) gastrointestinal unwanted effects made up 50% and symptomatic treatment was only required.

No bone marrow supression, nephrotoxity, lung toxity, vasculitis, or increased nodulosis were encountered in our study.[16]

We conclude that long term low dose pulse therapy with MTX in RA is safe and effective and has the added advantage of economy and better patient compliance. It also has a relatively faster onset of disease modification[8,14] and may be the DMARD of choice.

References

1. Mowat AG : The management of inflammatory joint disease in Oxford Text Book of Medicine, eds. Weatherall DJ, Ledingham JGS, Warrel DA, Oxford University Press, Oxford : 16.61-16.75, 1987.
2. Ruddy S. : The management of Rheumatoid Arthritis. in text book of Rheumatology, Eds Kelly WN, Harris ED, Ruddy S, Sledge CB, W B Saunders Company, Philadelphia, 2nd ed; 979-90, 1985.
3. Frank C Arnett, Steven M, Edevorthy et al. : The American Rheumatism Association 1987 revised criteria for classification of Rheumatoid Arthritis; Arthritis Rheum, 31, 315-324, 1988.
4. Weinstein GD, Frost P, : Methotrexate for Psoriasis : A new thereapeutic schedule. Arch Dermatol, 103, 33-38, 1977.
5. Gubner R, August S, Ginesberg V : Therapeutic suprression of tissue reactivity. II, Effect of aminopterin in rheumatoid arthritis and psoriasis. Am. J. Med. Sci. 221. 196, 1951.
6. Witebsky E., Immunological aspects of rheumatoid factor. Arthritis Rheum, 6, 402-413, 1963.
7. URK Rao, Anuradha R Thopu, MUR Naidu et al. Early beneficial effects of low dose oral methotrexate in rheumatoid arthritis. JAPI, 38, 335-336, 1990.
8. Yadunath Singh, Manoj Sharma, Singh RR, et al. : Methotrexate: Clinical and immunological effects in refractory rheumatoid arthritis. JAPI, 40, 658-665, 1992.
9. Michael EW, David E Trentham, Patricia AF et al. : Long term prospective trial of low dose

methotrexate in rheumatoid arthritis. Arthritis Rheum, 31, 167-175, 1988.
10. First DE, Kremer JM, Methotrexate in rheumatoid arthritis. Arthritis Rheum, 31, 305-314.1988.
11. Julie Aponte and Petrelli M. : Histopath finding in the liver of rheumatoid arthritis patients treated with long term bolus methotrexate. Arthritis Rheum, 31, 1457-1464, 1988.
12. Joel ML, Randall GL and Keith GT. : Liver histology in rheumatoid arthritis patients receiving long term methotrexate therapy. Arthritis Rheum, Vol 32, 121-127, 1989.
13. Khanna MU, Abraham P, Shihare SS, Tile GH. Scintigraphic rigitto left liver lobe ratio and liver to spleen ratio in cirrhosis and non cirrhotic liver dieseases. JAPI, 39, 265-267 1991.
14. Weinblatt ME, Coblyn JS, Fox DA et al. Efficacy of low dose methotrexate in rheumatoid arthritis N Eng J Med 312, 818-822, 1985.
15. Aponte J, Petreili M : Hepatic histology following prolonged treatment with bolus Methotrexate. Arthritis Rheum 28 (Suppl 4) : 537, 1985.
16. Rafael Segal, Dan Caspi, Mosbe Tishler et al. : Accelerated nodulosis and vasculitis during methotrexate therapy for rheumatoid arthritis, Arthritis Rheum, 31, 1182-1184, 1988.

IJPMR 6 (2) Oct. 1993

Guest Article

Soft Energy for Pain
(Clinical Application of Soft LASER - 632)

Dr. K. Janardhanam,

One of the latest electrotherapeutic techniques now available for the physical medicine specialist for the treatment of pain, inflammation and oedema is "LASER".

LASER is only an acronym standing for "Light Amplification by Stimulated Emission of Radiation." The Laser beam is produced when the atoms of certain elements are excited by electromagnetic radiation. The Laser unit being discussed in this article is a low-power, athermic, soft Laser Combining Helium 85% and Neon 15%, along with infrared radiation. The infrared allows the beam to penetrate deeply into the tissues, even upto 30 mm.

The corpuscular theory of light was put forward first by Einstein in 1917. In 1960, Maiman devised the Ruby Laser for industrial purposes. In 1964, Townes, along with others, was awarded the Nobel prize in Physics for the discovery of modern Lasers. From 1968 to 1978, a lot of research was made on this subject, and in 1978, diode (gallium arsenide) Lasers were put in use. The active medium in the Laser may be solid, liquid or gas. In medical practice, the gas Lasers are often used. They are again classified as high power Laser, mid - Laser and soft Laser. The high power Laser contains Co_2, Neodyne yag or Arseno-gallium and has a thermic and destructive effect on tissues and used in surgical practice for cutting and coagulating. The soft Lasers contain gaseous mixture of Helium (85%) and Neon (15%) and athermic as the power emitted is as low as 1 milliwatt to 50 milliwatts. This soft Laser is now put to use in many parts of the world to treat various musculoskeletal disorders which produce pain, inflammation, oedema and ulceration.

To produce a Laser beam, the three essential components required are : 1) active medium, 2) pumping (external energy) and 3) optical resonator. 1) The active medium is the gaseous mixture of Helium (85%) and Neon (15%). 2) The external source of energy is the electrical current of high voltage, say 2500 volts. 3) The optical resonator is in the form of 2 concave mirrors, set apart facing each other. The beam bounces back and forth between the mirrors producing a number of lines. One of these mirrors is partially transparent to allow a certain number of photons to escape constituting the Laser beam, emitted perpendicularly to the mirror. The principle of Laser beam is thus due to the spontaneous emission phenomenon of photons, followed by stimulated emission. The mode of emission may be continuous, pulsed or modulated.

The characteristics of Laser light are :

1) Monochromaticity :

The radiation is of one selected wave length and comprises of light of one colour only. White light as emitted by bulbs or daylight is a mixture of all wave lengths and all spectral colours.

2) Coherence :

All Waves are of the same phase. Bulbs show spontaneous emission only and hence non-coherent. Laser is of the nature of stimulated emission with a maximum photon density.

3) Parallelism :

Unidirectional. All the rays are parallel and not divergent is in contrast to that in the ordinary light. This helps high directivity and concentration of projection on a selected specified area of

Correspondence :-
Dr. K. Janardhanam, Professor of Physical Medicine & Rehabiliation, Rajah Muthiah Medical College Hospital, Annamalai University, Annamalainagar - 608 002. Tamil Nadu

body.

4) Athermic :

No heat is produced as the power is of the range of 1 milliwatt to 50 milliwatts only.

5) Luminous Emittance :

The Laser beam is highly luminous, as bright as the sun, 10,000 times more than the ordinary light. It is dangerous to look at the beam directly with naked eyes as it has damaging effect on the retina. Hence both the patient and the doctor or the therapist use the special goggles during application of the light.

Laser light has a number of biological effects on the human tissue, which are made use of in treating the various musculoskeletal disorders, such as degenerative osteoarthritis, low back pain due to strains and disc prolapse, rheumatoid arthritis, acute sports injuries with a view to reduce pain and inflammation. It also helps to reduce oedema and hasten wound repair by cell proliferation and as such used in treatment of pressure sores. Thus the Laser acts locally on the spot to bring about certain biochemical changes in the cells and tissues and not centrally on any system of the body. It is somewhat similar to the process of 'photosynthesis" in plant where solar energy is utilised to produce chlorophyll in the plant cells.

The analgesic effect of Laser, though not very well understood, is supposed to be due to the diminution of prostaglandins and increase in enkephalins and endorphins which are biochemical agents in the cells. The analgesic effect may also be due to modifications of alfa and delta nerve cells and also due to increase of serotionin increase of serotonin in blood. It is certainly not due to the "Gate control theory."

The anti-inflammatory effect is also due to the same biochemical changes mentioned above.

The wound healing effect is due to the increase in the mitochondrial, mitotic and fibroblastic activities, along with local revascularisation and increase of adreno-nucleic acid. The relief of oedema is due to the improvement of the local lymphatic drainage. All these help the cell proliferation to a great extent, thereby promoting the healing of wounds and sores.

There are very few contraindications for the use of Laser. They are 1) vascular diseases and bleeding diseases, 2) menstruation, 3) pregnancy, 4) epilepsy, 5) those with cardiac pace-makers, 6) certain endocrinal disorders, and 7) skin infections. The advantages of using Laser are 1) no overdosage any time, as the excess rays are not absorbed but scattered, 2) no side reaction or adverse effects on other systems of the body, and 3) a very few contraindications as mentioned above.

A standard Laser therapy equipment consists of a tube encased within a metal casing with a programme panel and emitting a beam of wave length of 900 nanometers. The infrared part helps the beam to penetrate to a deeper level into the tissues even upto 30 mm. In some, in addition, there is an acupuncture detector to trace out the acupuncture points in the body.

Extreme care has to be taken in installing and operating the equipment as the components are very delicate and may go out of order, if not handled properly.

The equipment is better kept in a dustfree airconditioned room, away from bright light, along with a voltage stabiliser and a spike buster to combat the fluctuations of voltage. Special goggles should invariably be worn, both by the patient and the operator. The Laser beam should be as far as possible perpendicular to the skin to optimisse absorption and penetration. Only the areas to be treated should be expoed and the other parts preferably covered with linen. The beam can be projected by (1) scanning for larger areas and (2) probe for smaller areas.

At present, there is little comparative research available to evaluate Laser as a form of treatment. A lot of study has to be done to establish its definite role in the treatment of musculoskeletal problem. It is hoped that, in the years to come, Laser will have a significant role to play in the medical management of many conditions.

IJPMR 6 (2) Oct. 1993
Guest Article

Rehabilitation of Arm Amputees

Colonel D.S. Vohra

Man's attempt to find a suitable artificial substitute for the loss of an extremity begins with the earliest history of mankind. Ancient history affords examples of prosthesis used at the begining of the fifth century BC when a native of ELIS and a Seer was thrown into prison and condemned to death by the Spartans. He escaped by amputating his leg and then fitted himself with a wooden foot. He was again present at the battle of PLATACA in 479 B.C., until caught again and put to death. Probably, the most historic of all antique prostheses was an artificial hand by Goetz Von Berlichingen in 1509, who had lost a hand in the seige of Landshut in Bavaria. It was an amazing example of the skilled craftmanship of that period.

Some of the artificial limbs and other appliances of by gone ages in some of the museums of europe, speak of the excellent workmanship. Whereaas, the artificial leg or support, enabled them to walk again, the artificail arms and hands were so designed that by wearing those, it would be possible for soldier to hold bridle of the horse, leaving his second arm free to wield a sword.

However, real changes were seen in this field only in the first half of the present century - especially after the two world Wars (1914-18 and 1939-45). The present day artificail limbs, their remarkable improvement in design and mechanical efficiency coupled with marke advances in the surgical techniques are the result of experience gained from thousands of amputations during the two Great Wars, , besides the combined efforts of the orthopacdic specialist and the Limb Marker.

Correspondence :- Colonel D.S. Vohra, Director and Prosthetic Adviser, Nevedac Prosthetic Centre, Daulatsinghwala (Chandigarh)

Unfortunately, Indian history does not say much on the subject except for the crude type of aids

As our know-how in this field were rather of a primitive nature, the then Government of india, invited a team of experts from Roehampton-London in 1945, to advise on the rehabilitation of a fairly large number of disabled soldiers-both from World War I and World War II. It became necessary to do so from the morale point of view - specially when the disabled British troops and disabled Class I Indian Commissioned officers were being sent to England for geting their artificial limbs/aids. The experts suggested training of our personnel in England for setting up an Artificial Limbs Centre in India. On their recommendation a team of 13 craftsmen from the Corps of Electrical and Mechanical Engineers, Indian Army went for training at Roehampton. along with 3 surgeons from the Army Medical Corps. The author was asked to establish Artificial Limb Centre at Pune as Founder-Director. Over the years, a few Limb Fitting and Rehabilitation centres have been established for the disabled civilians - besides the Artificial Limb Manufacturing Corporation of India (A Govt of India enterprise) at Kanpur.

DEVELOPMENT OF ARTIFICIAL ARMS

Although, a lot has been said, written or claimed, the fact remains that rehabilitation of the arm amputees, still has not reached its desired perfection anywhere in the world-despite extensive and expensive re-search and introduction of electronic arms/hands. There appears to be complete lack of understanding to the limits to which any arm prosthesis may reasonably be expected to function. Also, there is lack of honest and realistic interpretation of these

limitations to the patient with arm amputation.

Unfortunately the functions, sense of touch and prehension cannot be duplicated in the artificial hand. Other factors for not showing interest are.

(a) Comparatively, the number of arm amputees is far less than the leg amputees.

(b) A leg amputee becomes immobile and grounded without an artificial support. He will therefore, accept anything that can give him mobility; be it a pair of crutches, a peg leg or a sophisticated prosthesis, whereas a arm amputee requires something that gives him genuine utility and confidence.

(c) The loss of an arm will not, (unless a bilateral amputee, totally disable a person to the same extent as would a loss of one leg which has a definite bearing on the functioning of the other (sound) leg. While both legs form a systematic unit, each arm must be considered, more or less, an independent individual. In a large number of cases, he would not like to wear the artificial appendage constantly or will even discard it.

(d) The disability of the upper extremity, does not hinder the tasks of locomotion and weight bearing.

(e) A human arm has vital mechanisms of supporting, pulling and pushing the body, of gripping and holding, of feeding and clearing, of protecting and fighting. Besides, the human arm and hand serve as a means of expression for many primary psychic functions.

Inspite of what has been stated above and the difficulties encountered-both by the amputee and the limb makers, practically all arm amputees can be and should be fitted with a suitable prosthesis, through proper judgement and selection of the type required. To create the desired confidence, and for getting the maximum utility, greater attention must be paid on training the amputee to use his prosthesis/appliance. Without proper training, the entire effort will be futile.

Like lower extremity, the causes for the loss of upper limb are :

(a) congenital deficiency of a limbs

(b) disease and infection, - leprosy, malignancy gangrene etc.

(c) gun shot wounds

(d) accidents - including industrial hazards and mechanised farming eg. Thrasher Victims

Unfortunately, in Punjab and its neighbouring States with agro-industry a fairly large number of labourers loose their arms (one or both) during every thrashing season. This is indeed pathetic, specially when practically all victims are from the lower income group.

An attempt was made, a couple of years ago, to study the same through the Punjab Agriculture University at Ludhiana. It was found that during the wheat thrashing season of 1980, as many as 301 cases were located. Considering the number of wheat thrashers curently used in the state of Punjab to be about 2.3 lakhs, it comes to about 13 accidents per 10,000 machines in use. The accidents take place in all age groups and include female victims as well (3 to 4 percent). Main causes for these accidents are defective designs of the thrashers i.e. absence of safety devices, lack of proper training to use the machines, greed of the landlord for enhanced production, greed of the worker to earn more, irregular electric supply and use of drugs/intoxicants by the operators to get over the fatigue because of prolonged hours of hard work in the fields.

Correct amputation and post-operative treatment simplify the manufacture to a great extent, experience has shown that the amputations carried out in some of the district hospitals are fashioned with little or no regard for their functional requirements or from the prosthetic point of view. The tendency on the insistence of the patient has been to save the maximum. But an 'Ideal Stump' allows for fitting of the proper

mechanisms, e.g. wrist and elbow etc. These briefly are :

(a) Hand

If all the fingers are stiff or do not work voluntarily, the amputation should be performed through the forearm and NOT the wrist, to enable incorporation of the wrist mechanism.

(b) Below Elbow

Ideal length is seven inches from the elbow joint. Minimum that can be fitted is four inches of ulna.

(c) Above Elbow Ideal length is eight inches, minimum that can be fitted is about five inches; measured from the acromion process.

(d) Through shoulder

Save at least one inch; since the head of the humerus affords prominence round which the shoulder cap can be moulded and fitted properly.

(e) Through Elbow

amputation is NOT desirable as it makes the prosthesis clumsy and ill fitting.

Other qualities required of an Ideal Stump, briefly are :-

(a) Scar should be terminal and NOT anterior or posterior, to avoid rubbing of the Scar against the socket and consequent damage, as upper limbs are not end weight baring. Stump, of course, should be soundly healed.

(b) Flap - The shorter the flap, the better it is for circulation and the wound will heal quicker. The flap should be linear without folds, freely mobile and away from pressure.

(c) Similarly, division of muscles, division of bones and proper treatment of nerves during operation, require careful planning - besides post-operative care.

(d) Stump should tolerate firm pressure and patient ought not to complain of tenderness when stump is firmly grasped.

(e) Joints above the amputation should move fully.

FITTING OF PROSTHESES

Arm cases can be fitted as soon as the stump is fully healed-specially if the patient complains of phantom pain. In fact, if the prosthesis is fitted earlier, it becomes much easier to train the amputee to use it.

As far as possible, the rehabilitation of an arm amputee should commence immediately after amputation. Physical rehabilitation of a patient cannot achieve complete success unless attention is given to his mental rehabilitation.

The desire for an artificial limb is frequently absent if the patient is referred late to a limb fitting centre. Some patients are proud that they are able to perform most actions with one hand. Nonetheless, they should be given encouraging talks, audio-visual aids and preferrably demonstration by those already wearing artificial arms.

On the other hand, bilateral arm amputees present quite a different picture. The shock and horror at the loss are much greater. Their plight can be regarded even worse than the blind. They become so helpless and dependent for practically every activity of their daily life.

They are usually most co-operative in the efforts made towards their rehabilitation. The speed and facility with which they master the intricacies of artificial arm usage continues to be a source of wonder and admiration.

To expedite rehabilitation and create the desired confidence, the arm amputees, specially the forearm amputees, should be encouraged to use their stump as much as possible. So tendency for the nurse, the ward orderly and the relatives to feed them should be resisted. For example, a spoon can be bandaged to the stump, by means of which the patient can feed himself.

As no two patients are alike, mass production of artificial arms, except a few component parts of standard design, is not possible. Prescription therefore, depends on the patient's physical disability, profession, age, weight and other individual peculiarities. Besides plaster cast,

moulds are prepared and measurements taken on special measure charts.

TYPES OF ARTIFICIAL ARMS/HANDS

The upper arm prostheses can be mainly categorized as follows :

(a) COSMETIC DRESS HANDS

As the name implies, the cosmetic arms/ hands are mainly for cosmetic/show purposes. These have no functional value. These are mostly carved out of wood or laminated with PVC resins. In India, mostly cosmetic hands are used.

(b) MECHANICAL HANDS

Although, Mechanical hands vary in design, their basic principle remains the same. After World War I, there was a tendency to duplicate in an artificial hand, all the motions of the natural one, including pronation, supination, and flexion and extension of the wrist. They were complicated and cumbersome. Fortunately, the present designs are comparatively much simpler, light and provide mechanical, features essential for proper functioning. Most mechanical hands are new made with two or four fingers mounted on a common axle with the thumb mounted on a separate axle or lever, running parallel to the finger axle. The covers may be made of wood, fibre glass, plastic moulded, aluminium or a combination of these materials.

There are two types of mechanical hands in common use. One is the voluntary muscle control type in which the fingers and thumb are held in extension by a light spring and are closed by muscle control from the opposite shoulder. Thus, the movements of prehension in the artificial hand are under the direct muscle control of the patient. The other which may be described as the spring tension hand is held in a closed position by means of a strong spring within the hand. The fingers and thumbs are forced apart against this spring by a pull applied from the opposite shoulder; when this pull is released, the fingers and the thumb close to oppose each other. With practice, an amputee-specially a below Elbow case, is able to duplicate many of the motions of the natural hand. Pronation and supination, as well as flexion and extension at the wrist at rarely used in the present day arm prostheses because experience has shown that these functions do not add much to its functional value but greatly add to its weight and complexity. Generally speaking, the only useful function that is essential is that of prehension between the thumb and the fingers.

(c) CINEPLASTIC AMPUTATION AND PROSTHESES

In the case of cineplastic amputation, the remaining muscles in the stump are utilized to activate the prostheses. This method of activating an artificial arm was first originated in Italy in 1897 and is reported to have ben applied to wounded soldiers from the abysissian Campaign. Although, the Italians continued to contribute towards its development, it was in Germany, after World War I, that Prof. Saurbruch developed the essential principles of the modern cineplastic amputation and established a practical technique of the method.

The muscles are utilized by mean of ivory/ plastic pegs, passed through/tunnels in the muscles and attached to levers operating the artificial hand mechanisms. The bicepss and triecps muscles in the upper arm stump and the flexors and extensors in the forearm stump, control the grasp and release of the fingers of the artificial hand, thus permitting a close approximation to the natural hand action.

Although, cineplastic prostheses were used in Europe and some in the USA, these are no longer popular even in those countries, mainly because of the weight of the prostheses and discomfort in the stump. In most cases, the patients develop irritation in the muscular tunnels/due to the friction caused by the plastic/ ivory pegs. This type has NOT even been attempted in India.

(d) EXTERNAL POWER SOURCES

Only two types of external energy are know

to have been seriously considered for prosthetic uses: electrical and pneumatic. The latter was found unsuited for artificial arms because of the weight required for structures capable of withstanding the necessary operating pressures. A few years ago, an artificial arm, operated by small cylinders of highly compressed carbon dioxide was developed in Germany but little is known about its success.

(e) MYO-ELECTRIC OR ELECTRONIC DEVICES

Recently, a number of attempts have been made, specially in Germany, to utilize electrical energy through the medium of electro-magnets. The earliest arm of this type was constructed in Germany after the first World War. Since then, several independent inventors have constructed hands on this principle most notable amongst them being M/S Otto Bock Orthopaedic Industry in West Germany. From utility point of view, it has not really proved very successful.

(f) TERMINAL DEVICES/APPLIANCES

Notwithstanding the development and research in artificial arms/hands, the fact remains that terminal devices or working appliances cannot be dispensed with. These are used all over the world and have several designs to suit each occupation or profession of an arm amputee, i.e. a table spoon to farming and universal appliances for doing heavy, manual jobs. Each patient gets a set of these, depending upon his occupation/profession. A Split Hook or Dorrence Hook is invaribly given to all. These are either snap fitted or screwed on the rotaries.

(g) COSMETIC GLOVES

As mentioned earlier, in the rehabilitation of upper extremity amputee, not only is it necessary to restore the lost function, it is also important to restore the appearance. For this purpose, generally a Cosmetic Glove is provided which is worn over the artificial hand. The glove is made after constructing moulds for a shape as complex and detailed as the human hand. The life of a cosmetic glove depends on its use by the wearer.

(h) APPENDAGES/SUSPENSION FOR UPPER EXTREMITY PROSTHESES

Some sort of suspension or an appendage is necessary for all types of upper extremity prostheses to suspend/secure the same to the stump. They also act as the muscular substitute or artificial tendons which utilize the powerful muscles of the shoulder and trunk to control and operate the prostheses. These appendages are normally made from cotton webbing or leather or a combination of both. These are designed

An arm amputee, plying a rickshaw with the aid of Nevedac mechanical hand

A bilateral arm amputee, eating and drinking with her mechanical hands.

separately for each type of arm disability.

CONCLUSIONS

Rehabilitation of upper extremity amputee poses much greater and complex problems. Even though research and development even in the highly industrialized countries have been going on for several decades, there still is no prosthesis that can meet the needs of the arm amputees. In India, this subject has unfortunately remained practically neglected mainly because of the confusion created by some that we should have simple type of appliances.

Our designs should be as upto date as possible, keeping in view the economic and occupational/professional needs of our amputees, areas and environments to which they belong cosmetically presentable and our designs should, thus be need based. The Govt. of India, Ministry of Welfare Scheme for providing free or subsidised aids/appliances to our physically handicapped persons is quite liberal and flexible. This and other schemes of the Government plus help from philanthropists, provide enough incentives to look forward to modernization in this field.

At the same time, the Government should encourage and liberalise the import of samples, materials and techniques from other countries.

Stress must also be laid on proper training in the use of the artificial arms. Every efforts should be made to put him back in his original profession and near to his original place of work or residence. Failing this, he should be taught a suitable trade or hobby, to make him economically independent. In the case of bilateral arm amputees, they can be easily trained and employed as office peons, chowkidars and painters/decorators.

The thrashers cannot and should not be banned, but Government can enforce safety measures through proper legislation.

Letter to Editor

What is happening to PMR in India ?

Dear Sir,

Allow me the privilege of your journal to reach our member to ventilate my feelings about PMR. Physical Medicine and Rehabilitation is at a critical juncture all over the world and particularly in India. It had advanced as a field of medicine in every way it has been accepted by academicians that Rehabilitation is one of the three major branches of Medicine. The other two being Preventive Medicine and Curative or Management Medicine. Inspite of all this field as Physical Medicine and Rehabilitation is not recognized by our own colleagues in other branches of Medicine. General public does not understand the meaning of Physical Medicine or Rehabilitation and the Physiatry is confused with Psychiatry.

What is happening ? Where is the fault ? It is time for us to take stock of the situation and get us back in the main stream.

First of all what is Rehabilitation? Rehabilitation is not merely giving some body a walking aid or a wheelchair. It is not a method of treatment. Not even principle of treatment. Rehabilitation is not a specialized technique of treatment. Rehabilitation is a philosophy in action - the philosophy of total care of the patient as well as the continuing care for the patient.

In the Rehabilitation of disabled patients such as in cerebrovascular accidents, cerebral palsy, rheumatoid arthritis, amputations or severe multiple disorders of the musculoskeletal system the total care of the patient by any single individual is not possible. It requires a team effort by Physiatrist, Neurologist, Orthopedic Surgeon, Physiotherapist, Occupational Therapists, Orthotist and other Paraprofessionals with the Physiatrist leading the team or as the co-ordinator. If one has to be the leader he/she should be well versed in all the aspects of the management plan but not necessarily a master in any of the areas. But he/she should be able to grasp the situation to make the decision and guide the other team members to help the disabled.

The problem we are now facing is that there is an absolute lack of awareness about the speciality among our own colleagues. I was surprised to hear form a Rheumatologist saying "What do the Physiatrists know about the treatment of arthritis? You should be a doctor and know your immunology" displaying his lack of understanding of Physiatry and Arthritis! Another one an examiner for the Physiotheraphy students said, "So you are an orthopedic surgeon"?

Unfortunately this speciality has become an Orthopedically oriented speciality. Most of our distinguished senior colleagues are Orthopedic Surgeon turned Physical Medicine and Rehabilitation specialists. Their loyalty lies with orthopedic surgery first. Probably they were the first people to realize the value of this specialty and pursued it. We have to thank them for developing it. There is nothing wrong in it. But the parents should recognize the adulthood of their wards and stop looking over their shoulders and to let them develop on their own identity.

Every one should realize that this is an independent speciality and should be allowed to develop as such. There should be no condition the Dip. in Ortho is needed to become a PM&R Specialist or to get a promotion. With the orthopedics background you are basically a Surgeon and you do the best you know - OPERATE said Dr. Ernie Johnson of Ohio. A patient with back pain goes to the Orthopedic Surgeon and knives are thrown at him from all around. Later in the

mid seventies the Surgeons decided that surgery was not the answer for back pain. The best treatment for chronic back pain is TIME AND MOTHER NATURE says Dr. Ernie Johnson in his editorial in the AAP Journal and I tend to agree with him. The other Orthopedic Surgeon is reluctant to send his patient to another Orthopedic Surgeon basically because he thinks that what one Orthopedic Surgeon does the other can also do. In the end the patients are the ultimate losers as they get less than optimum care.

One of the biggest drawbacks we have is that our specialty does not have an organ of its own as in the case of a Cardiologist a Heart, Lung in Pulmonology, Kidney in Nephrology, Bone in Orthopedics. For PM&R we have the whole body, family and the environment. The Family Physician and the Specialist should be made aware of this fact. And as we have seen earlier in whole team takes over in the management of the patient. The creating of the awareness should be started at the undergraduate level. All the Medical Schools should have a fully equipped Physical Medicine and Rehabilitation unit manned by a well trained Physiatrist. The Universities should take a second look at the curriculum. The first clinical year students should be posted in the department for learning the musculo skeletal system assessment and later on the intergrated teaching should be encouraged. A disabled patient is to be followed by the student from admission to discharge with him taking an active role in the treatment planing and management decisions. This will let the students have a feel for all the areas in medicine and when he gets out he can send his patients to the appropriate specialists for help. He will also be encouraged to take up this speciality.

At the post graduate level we should revamp the curriculum. A PMR student go through General Medicine, ICU, Pulmonary Medicine, Neurology and Neurosurgery, Orthopedics and Pediatrics. One need not know every Orthopedic Surgery or Neurosurgical techniques but should have a basic working knowledge to help him in the Rehabilitation of the patient. The same way the student should undergo a basic training in Physiotherapy, Occupational therapy, Orthotics and Prosthetics as well as exposure in Speech and Hearing the General Psychology. Again there is no need for him to know every technique in book but have good working knowledge to guide the paramedical professionals to help his patients. The post graduate course should be of four years duration to enable him/her to complete this sort of rotation. There should not be two level postgraduate studies in PMR and for that matter in any speciality. It is also time for us to go to the Government and tell them that PMR does not need D. Ortho. to get his promotion in the Government service any longer.

There is one important thing that is causing a lot of heart ache and belly aching at the same time. This is the relationship between the Physiatrist and Physical Therapist and the inability of the medical community to distinguish us. The attitude of one towards the other is causing an eternal misunderstanding. This is simply because each one has a bigger ego than the other. It is time every one takes pride in their own field of specialty and work for the benefit of our benefactors: the patients. It is also time that every one realizes that Physician is the one who evaluates the patient and makes a diagnosis taking into consideration of all concomitant disorders and problems with the patient and then prescribes the treatment. A Therapist is the one who, like the Nurse carries out the treatment plan after ascertaining the facts to his own satisfaction and communicates with the Physician to review the treatment plan and the Progress and to modify the treatment when needed. Deviation from this is not justified and injurious to both the professions and the patients as well in the long run.

To summarise the whole thing :

Reasons for slow recognition are -

1. Lack of awareness among Medical Profession and among the general public.
2. Lack of organised programs to highlight the importance of this speciality in Medical Schools.
3. Non recognition of this Speciality as an independent Speciality on its own right.
4. Lack of good working relationship between the Physiatrists and the Physiotherapists.

What do you do ?

1. Full fledged departments of Physical Medicine and Rehabilitation in every teaching hospital.
2. Integrating the PMR Department as an undergraduate teaching department.
3. Revamping the Physical Medicine and Rehabilitation curriculum.
4. Creating a good rapport among the Physiatrists and other Consultants.
5. Creating a good healthy professional relationship among Medical and Paramedical professionals.

- Dr. K.S. Govindarajan

9 Alamu Nagar, Sathy Road, Coimtbatore-641012

Off : Director, SRIPMS Coimbatore 641044

Address for Correspondence :

Dr U Singh
Editor, IJPMR
Dept of Rehabilitation
A.I.I.M.S
New Delhi 110029
India

The multi-disciplinary professional journal is devoted to the needs of the servie providers, profssionals, applied resarchers and educators.

Frequency of Publication : April and October every year.

Subscription Rates :

	Annual	Single copy
Inland	Rs. 180/-	Rs. 100/-
Foreign	US$ 20/-	US$ 15/-

Subscription, which includes surface postage, should be paid by bank draft in favour of the Editor, IJPMR, payable at New Delhi.

Claims : For issues not received, claims may be made within 3 months of publication of that issue. Issues are sent under postal certificate. If desired, the copy of the journal can be sent by registered post on due advance payment.

Order for back issues shall be sent to the editorial office. Issues prior to two years of the current issue, if available, shall be supplied at 50% rabate.

Note : Kindly intimate change of address to the Editor.

Office Bearers of
Indian Association of Physical Medicine and Rehabilitation

President	Dr. MHR. Rizvi, Patna
President Elect	Dr. RK. Srivastava, New Delhi
Vice President	Dr. G Ram Das, New Delhi
Secretary	Dr. S. Ramar, Tirunelveli
Jt. Secretary	Dr. Sanjay Wadhwa, New Delhi
Treasurer	Dr R Sharma, New Delhi

Members

Dr. VK Gupta	Dr SY Kothari
Dr Shasikumar	Dr UK Jha
Dr AJ Rajendran	Dr T Sreedhar
Dr CR Gupta	Dr Hanumantha Rao

Editor Newsletter	Dr S Hariharan, Trivandrum
Asst Secretary	Dr TJ Ranganathan, Coimbatore

Secretariate
Dr S Ramar
Secretary IAPMR
32 Perumal Sannathi Street
Tirunelveli 627001

Editorial

Limiting practice to a specialised area allows the physician to practice with greater accuracy and skill leading to doing more good to suffering patient.

Inter specialities prejudices tend to relegate the role of newer specialists to humiliating status.

The felt need of the spectrum of disability seen in our country, also in the developing world, compel us to understand many problems that had been mysteries before. The physiatrist in India albeit trained on an occidental model, is beginning to realise the importance of developing subspeciality programmes, both to improve teaching and patient care.

Reliance on associated specialities for minor surgical interventions in rehabilitation programe of the neuro-musculo-skeletal morbidity associated with locomotor handicaps, is neither possible now nor is necessary.

Till such time that the national policy on health is successful in the prevention of handicap the need of such Rehabilitation Surgical training will continue. Undoubtedly there will be improvement and innovations in the future that will make our proposed initiation to surgical skills consistant with the bizzare morbidity we are facing in a comprehensive Rehab. Programme.

But surgery must & shall represent a small part of our responsibilities and it should decrease progressively.

The conventional services we now provide are important but we must add more dimension to it. Advertise we must what special skills we can offer to our patients indulging in sports and the like.

An increasing repsonsiblility is to enhane our ability to deal with changing social behaviour, psychological and medical problems of aging, spend more time with each patient, be more aware of their special needs and become more familier with agencies to which they can be referred for help, instead of delegating such tasks to others in the team.

Our clinics are so full of well established deformities that we have devoted too little time, to truly preventive causes - preventive care ranging from prevention of basic disease per se to prevention of disability.

The guess as to the need for physiatrists may be as accurate as the guesses of demographers and sample surveys of disability. Factors that have to be considered in establishing needs are the increasing number of people and increased life expectancy. In a speciality as broad as ours and not so attractive, we must create programmes that will fill the needs of anyone who is interested, but also use interesting challanges and possibilities.

The speciality will be defined by the innumerable interactions - between patients and us. Each unique interaction represents a definition by the patient of those services he desires and a definition by the the physiatrist of the services he is willing to provide. Necessarily our involvement needs to be multifacated.

Dr. W.G. Rama Rao.

Editors Note

Many of you may have noticed significant changes in this issue of Indian Journal of Physical Medicine and Rehabilitation.

Dr. A.K. Agarwal after a long innings as editor and having endeavored in bringing out the issue every year, has requested that he be relieved. The new editors are honestly new to the job. But accepted the responsibility.

We count on you. Now that the Indian Association of Physical Medicine & Rehabilitation provided means to cover publication of 2 issues a year, We plunged in and hope the October 1993, issue will not disappoint you. One advertisement from you will go a long way to achieve our dreams - Peer review of all articles, clinical opinion section, a review article, invited editorials, acknowledgement of our referees, to name a few. We need and hope for your guiding hand.

Soon we hope to have out-standing people with special experience in the field, to add depth, on the journal staff. We shall struggle constantly to improve the journal. Perhaps you will egg us to do that with a letter to the editor.

Change is inevitable. It is always accompanied by regrets at the good that is lost. However we are sure it will make us work harder to live up to the standards of our past editors.

The editorial staff assure you that this will be our goal.

Dr. U. Singh.
Editor