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Surgical Reconstruction of Pressure Ulcers in Patients with Spinal Cord Disease: A Prospective Study

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Abstract

Objective: To study efficacy of surgery in the management of pressure ulcers in spinal cord disease.

Design: Prospective, follow up study.

Setting: Neurological rehabilitation unit of a tertiary centre.

Sample: Patients of spinal cord diseases with grade III/IV pressure ulcers, underwent surgical reconstruction and rehabilitation in year 2005 with a minimum follow up duration of one year.

Outcome measures: Ulcer healing rate, postoperative complications, ulcers recurrence rate.
Statistical analysis: Frequency analysis on SPSS 13.0 for windows.

Results: Surgical intervention was carried out in 25 subjects (M-19, F-6), having total 39 ulcers (stage III -16, IV - 23). Surgeries performed were: debridement - 3, split skin grafting -13 and flap mobilization and closure - 23. Only four subjects (16.6%) had initial complications: wound dehiscence - 2 and delayed graft healing -2. Follow up rate was 92.0% (23/25 patients), duration of 12-21 months (mean 15.4+/- 7.45m) and only four subjects (17.3%) had ulcer recurrence.

Discussion: All outcome variables showed significant improvement at follow up with good ulcer healing rate (87.0%), low initial complication (16.6%) and recurrence rate (17.3%).

Conclusion: Timely surgical interventions are necessary for pressure ulcers. Reconstructive procedures are simple & highly effective and should be an integral part of rehabilitation program.

Key words: debridement, pressure ulcer, flap mobilization, primary closure, recovery, rehabilitation, spinal cord disease, surgery, skin grafting

Introduction

Pressure ulcers have a human affliction since antiquity. Overall, 85% of subjects with spinal cord disorders develop a pressure ulcer during their lifetime, and around 8% die from them¹. Pressure ulcer result in the loss of therapy time, increase the duration of hospital stay,

escalate the cost of treatment, aggravate spasticity, delay neurological recovery, and impair quality of life. Various physical, pharmacologic, and surgical methods have been tried in the treatment of pressure ulcers. Sir John Staige Davies is credited with being the first to attempt surgical cure of pressure sores². Now, several decades later, several options are available for surgical management of pressure ulcers, including direct closure, skin grafting, skin flaps, and musculo-cutaneous flaps³. Immediate post-operative complications and ulcer recurrence rates at follow up have been remarkably high, particularly in

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patients with spinal cord injury^{4,5,6}. These high incidences can be brought down by comprehensive care provided by the rehabilitation team⁵.

The aim of our study was to determine efficacy of surgical interventions in the management of pressure ulcers in patients with spinal cord diseases.

Methods

This prospective study was conducted in the department of Psychiatric & Neurological rehabilitation, National Institute of Mental Health & Neurosciences (NIMHANS), Bangalore, India. Patients with spinal cord disorders admitted in the neurological rehabilitation ward with pressure ulcers within one year period of January to December 2005 having grade III/IV pressure ulcers were included in the study. Pressure ulcers were divided into four stages as per National Pressure Ulcer Advisory Panel (NPUAP 1989)⁷. Subjects with ulcers due to other causes, primary site of pathology other than spinal cord, grade I/II and poor general condition to undergo a surgical procedure were excluded from the study.

Socio-demographic and clinical information was obtained in a pre-designed format. The socio-demographic information included was age, sex, primary illness, and Braden pressure ulcer risk assessment scale⁸. The clinical examination was done according to the guidelines of the International Standards for Neurological Examination and Functional Classification of Spinal Cord Injury (ASIA Grade)⁹. The data collected for pressure ulcer were number, site, duration and staging of each ulcer. Photographs of all ulcers were taken preoperatively, postoperatively, after suture removal and repeated at follow up.

The principle of management was to treat the patient with the spinal cord disease as a whole and not the ulcer only. The intervention was divided into three continuous stages of preoperative, operative and post operative management. The preoperative management consisted of proper nursing care, bedside debridement and dressing and education regarding ulcer care. Operative interventions were decided on the basis of ulcer stage and presence /absence of eschar: grade III / IV necrotic wounds - debridement, grade III clean and granulating – skin grafting, and grade IV clean and granulating – local flap mobilization and primary closure. Post operative management consisted of continuous negative pressure by suction drain for 48-72 hr and appropriate wound hygiene. Sutures were removed on postoperative day 10, followed by gradual mobilization and weight bearing on the affected part.

Postoperative complications recorded were wound dehiscence, graft failure and bleeding etc. At follow up, ulcer recurrence and neurological examination were

recorded. All recordings were done by single evaluator. Outcome measures were initial complications after surgery, ulcer healing and recurrence rate. Frequency analysis was done for the outcome variables on SPSS13.0 for windows.

Results

Of 180 persons admitted in the neurological rehabilitation ward during the study period, 45 had pressure ulcers at the time of admission. Twenty five subjects (19 men, 6 women and 22 paraplegics, 3 tetraplegics) satisfied the inclusion criteria for the study. Age ranged from 13-45 years (mean 27.6 ± 7.45 y). The etiology of spinal cord lesions were: Transverse myelitis – 7, spinal tuberculosis - 6, spinal cord trauma – 5, spinal tumors - 3, ossified posterior longitudinal ligament – 2, lumbar meningomyelocele - 2. Neurological evaluation revealed most of the subjects in ASIA Grade A- 20 (80%), Grade B- 3 (12%), Grade C- 2 (8%), Grade D- 0 and Grade E- 0. Pressure ulcer risk assessment on Braden scale showed that 22 (88.0%) subjects were in high risk category (score <16), while remaining 3 (12%) had low risk (score >16).

Total twenty five subjects (39 ulcers) were included in the study: sixteen subjects (64.0%) had a single pressure ulcer; where as 9 (36.0%) had multiple ulcers. 5 (20.0%) subjects had two ulcers, 3 (12.0%) had three ulcers and 1 (4.0%) subject had four ulcers. The number of ulcers by stage at beginning of the study was: Stage III – 13 (33.3%), Stage IV- 26 (66.6%). The number and location of these ulcers were: Sacrum 13 (33.3%), gluteal region - 9 (23.0%), greater trochanter - 8 (20.5%), ischial tuberosity - 4 (10.2%), heel - 2 (5.1%), sole of feet - 2 (5.1%) and dorsum of ankle – 1 (2.5%). Most ulcers, 20 (51.2%) evolved in the acute care facility, 15 (38.4%) at home and 4 (10.2%) in the rehabilitation ward.

Surgical procedures carried out were: debridement, 3 (7.6%); skin grafting, 13 (33.3%); and flap mobilization and closure, 23 (58.9%). Single stage debridement was done in three subjects under monitored anesthetic care due to large size of sacral ulcers with significant necrotic tissue (Figure 1). Two of these subjects were referred to a general medical facility for management of the



Figure 1: Debridement – Pre and post debridement



Figure 2: Split skin grafting (Sequence of events)



Figure 4: Local flap mobilization and primary closure (Sequence of events)

associated co-morbidities, and their ulcers were not healed at the time of referral. Split skin grafting was done for 13 ulcers: sacral -5, gluteal - 3, heel - 2, sole -2, and ankle - 1 (Figure 2). Two grafts had postoperative complication, Methicillin Resistant Staphylococcus Aureus (MRSA) infection, which was managed by meticulous care and appropriate antibiotics. Both of these grafts were ultimately taken up but took a longer time. Local flap mobilization and primary closure was done in 23 ulcers: trochantric - 8, gluteal - 6, sacral -5, and ischial -4 (Figure 3). Two flap procedures had a suture line dehiscence as a result of the haematoma formation and excessive tension on the suture line. One of them required repeat closure while the other healed with conservative management. Therefore, postoperative complication occurred in 4 (10.2%) ulcers and consequently healing time was more in these four ulcers. Among rest 33 ulcers, average healing time for grafting procedures was 35.5 days where as, for flap mobilization and closure was 20.5 days. Thirty seven ulcers (94.8%) were healed at the time of discharge from the rehabilitation unit. The average time for starting sitting after surgery was 28 days, more for those who underwent grafting procedures than those with flap surgery.

All subjects were prospectively followed, but two subjects (who were referred to medical facility for the management of co-morbidities) were lost in follow up.

Follow up duration ranged from 12 to 21 months (mean 15.4 +/- 7.45). As compared to preoperative neurological status, 13 out of 23 (56.5%) patients had significant neurological recovery. Neurological evaluation at follow up revealed: ASIA Grade A - 5 (21.7%), Grade B - 1 (4.3%), Grade C - 2 (8.6%), Grade D - 15, and Grade E - 0 (Figure 4).

At follow up, ulcer recurrence was seen in 4 (17.3%) subjects: 3 (13.0%) had recurrence at the same site (all three were spinal cord injury and had a skin graft), where as, 1 (4.3%) had a new ulcer at different site (ischial). Ulcer healing rate was 87%; 20 out of 23 subjects had no local recurrence at the same site. Ulcer free rate was 82.7%; 19 out of 23 subjects had no new ulcer at follow up.

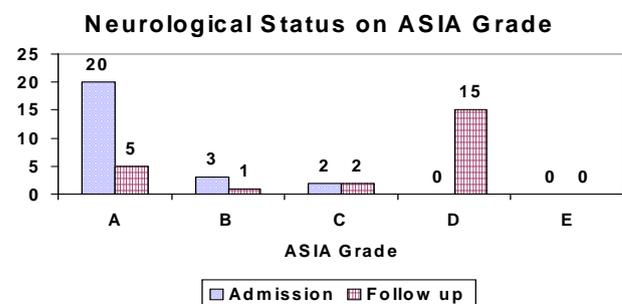


Figure 4: Neurological recovery on ASIA Grade at follow up as compared to admission

Discussion

Surgical management of pressure ulcer can provide skin and soft tissue coverage, physiological barrier to infection, eliminate dead space of the wound, and improve vascularity which enhances local oxygen tension, provides extended soft tissue penetration of antibiotics, and improves total lymphocyte function. In choosing the appropriate treatment strategy, consideration should be given to the stage of the wound and the purpose of the treatment. Wound care can be divided into non-operative and operative methods. Stage I/II pressure ulcers can be managed by non-operative means but stage III/IV requires surgical intervention¹⁰.

The surgical approach and management techniques have changed over the years. Some of these changes include reduction in the length of in hospital stay, wound cleansing and debridement methods, types of surgical procedures, and the reduction in postoperative immobilization. In our study, 6 (24%) subjects were admitted a week before surgery, while in the other 19 (76%) patients the admission to operative interval was long due to co-morbidities. Preoperative planning is mandatory. The decision to use a particular flap or type depends on the surgeon's expertise and preferences³. The position of the ulcer may suggest the most appropriate method. The local flap mobilization with primary closure method done in our study is a modification of double opposing semicircular flap for closing circular defects as advocated by Keyser et al¹¹. Diligent post operative care is important in avoiding the skin breakdown. Schryvers et al¹² in a study of 65 pressure ulcers managed by primary closure reported average healing time of 65.3 days which is much higher than our study of 25.91 days.

Suture line dehiscence and graft failure are most common complications after pressure ulcer surgery. In a 17 year review of surgical treatment of 280 pelvic area pressure ulcers in mostly spinal cord injured population, Foster et al¹³ found an overall 28% initial complication rate and 17% re-operation rate. Similarly, high complication rate of 36% and 42% have been reported by Disa et al⁶ and Schryvers et al¹² respectively. In our study, wound dehiscence and graft failure was noted in two cases each, all but one healed by conservative means, for which re-operation and closure was required leading to initial complication rate of 10.2% and re-operation rate of 2.6% respectively. Aggarwal et al¹⁴ in a study of 34 spinal cord injured subjects also reported lower (11.4%) incidence complications.

Postoperative ulcer recurrence is still seen with regularity, and success remains variable. Relander and Palmer⁴ reported a 48% recurrence rate for 66 surgically treated ulcers with follow-up ranging from 2 to 12 years

postoperatively. Similarly, Disa et al⁶ described a 61% recurrence rate at an average of just 9.3 months following reconstruction of 66 pressure ulcers. In fact, these dramatic statistics prompted the authors to question the validity of such reconstructions for both young post-traumatic patients and elderly patients with evidence of cerebral compromise. This work underscores that recurrence rates tend to vary not only according to anatomic wound location and closure method but also to pressure sore predisposing risk factors. Kirney et al⁸ in their 12-years review of 158 subjects with 268 pressure ulcers found an ulcer recurrence rate at same site of 19% which is comparable with our study of 17.3%. Similarly, low ulcer recurrence rates of 11.3% and 22% were also reported by Aggarwal et al¹⁴ and Bilkay et al¹⁵. In our study, recurrence rate was high among subset of subjects who underwent skin grafting procedures. In the treatment of pelvic area pressure ulcers, grafting has a useful but limited value because graft does not tolerate pressure well¹². As noted by Kirney et al⁵ active participation of the rehabilitation team in peri-operative care is important. The whole patient, not just the ulcer, needs treatment because there are many physical and psychosocial factors that require attention to optimize healing and prevent recurrence.

The higher success rate of surgical reconstruction in our study population can be due to supervised care and training provided by the combined and coordinated efforts of the rehabilitation team. But this emphasizes the need for involvement of rehabilitation team in the planning and management of patients with spinal cord disorders. Even if, patients with spinal cord disorders are admitted in other units for any procedures, timely referral to rehabilitation team will definitely improve the ultimate outcome.

However, there were few limitations in the study. The study has limited sample size and follow up duration was short. Large sample size and longer follow up duration may give better understanding of ulcer recurrence in patients with spinal cord diseases. Selection bias was there in the study in terms of age at onset, level of lesion and pattern of paralysis. As most of the patients were young adult paraplegics, had better participation in the rehabilitation program and became independent in ambulation leading to better ulcer healing rate at follow up.

Conclusion

Surgical interventions play an important role in the management of pressure ulcer in patients with spinal cord diseases. Wound dehiscence is a common complication, due to various reasons. Ulcer recurrence is more following skin grafting, if weight bearing is not prevented and there is no neurological or functional recovery. Timely surgical

interventions are necessary for grade III-IV pressure ulcers. Reconstructive procedures are simple and highly effective and should be an integral part of a rehabilitation program.

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Dynamic Evaluation of the Venous Pressure During Passive Plantar Flexion and Dorsiflexion Exercises with the RAGodoy® Apparatus

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Abstract

Objective: The objective of this case report was to dynamically evaluate pressure changes during passive exercises using a device that performs plantar flexion and dorsiflexion.

Design and setting: The medial vein of the left hallux was punctured using a 0.9 mm x 25 mm angiocat catheter and this was connected to a DTX Plus™ sensor. With this portable apparatus, pressure variations are measured at half-second intervals and the data stored in a numerical form. The RAGodoy® apparatus was used to perform passive exercises that stretched and bent the ankle joint.

Six evaluations were made and the minimum and maximum pressures during each session were assessed. **Main outcome measures and results:** In all the sessions, variations in the pressures were obtained with a minimum pressure of 8 mmHg and a maximum of 77 mmHg.

Conclusion: The device, named the RAGodoy®, creates pressure variations in the venous system, which assist blood flow in the lower limbs and thus it can be used to avoid venous stasis.

Key words: Dynamic venous pressure, Lower limbs, Passive exercises, Device, RAGodoy®.

Introduction

The main purpose of venous circulation is to return the blood back to the heart where it is re-oxygenated and recirculated. When a person is motionless and seated, part of the venous system has to work against gravity. In combination with the anatomic characteristic of valves, the muscles and tendons that surround the deep veins, work as a pump that forces the blood from the legs back to the heart. The venous valves act to prevent reflux and

thus this pumping mechanism compensates the effects of gravity and prevents venous hypertension converting the static condition into a dynamic flow^{1,2}.

Variations in the venous pressure gradient during walking exist between the veins in the thigh and lower leg as a consequence of the action of these muscle pumps².

Virchow's triad objectively defines the three major components that lead to thrombotic events: venous stasis, endothelial lesion and hypercoagulability.

The prevention of thrombosis is necessary in patients who are exposed to thrombotic risk, however they can

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not always receive the recommended treatment due to contra-indications such as in cases of active bleeding and immediately after suffering strokes. The main location affected by thrombosis is the lower limbs with the calf muscle region being the most common site.

Mechanisms that prevent venous stasis may be useful in patients who are contra-indicated for anticoagulation³. The use of an apparatus to perform plantar flexion and dorsiflexion exercises with continuous passive movements may improve the venous flow of the limb⁴.

The objective of this report was to make a dynamic evaluation of pressure variations during exercising with an apparatus that performs plantar flexion and dorsiflexion exercises.

Method

The medial vein of the left hallux of a 46-year-old male volunteer, who presented with telangiectasia (CEAP 1) of the lower limbs at clinical examination, was punctured with a 0.9 mm x 25 mm angiocat catheter. The catheter was then connected to a DTX™ Plus sensor, a portable device development by Godoy & Braile in Braile Biomédica in São José do Rio Preto, Brazil. This device is utilized for invasive pressure measurements, collecting the data at half-second intervals and storing them for future management.

The RAGodoy®, an apparatus that performs plantar flexion and dorsiflexion exercises, was utilized to dynamically evaluate venous pressure variations during passive exercising (Figure 1). Six evaluations were made, the data were stored as numbers and presented in the form of a graph.



Figure 1 shows the equipment and the positioning of the limbs during exercising

Results

In all evaluations, variations in the pressure gradient were detected as are illustrated in Table 1.

Table 1: Minimum, maximum and mean pressure variations (mmHg)

Evaluation	Minimum Index (mmHg)	Maximum Index (mmHg)	Mean (mmHg)
1	12	75	18
2	8	62	19
3	13	43	30.5
4	12	77	42
5	17	66	20
6	18	66	23

Discussion

The RAGodoy® is an apparatus that was developed with the primary objective of preventing deep vein thrombosis (DVT) in immobile individuals such as patients in the surgical center, intensive care units and on hospital wards. However, the first studies were on patients with lymphedema, where the objective was to perform mechanical lymph drainage⁴. The action of the apparatus is to reproduce some of the movements in structures experienced during walking that is, bending and stretching the ankle joint. One of factors in Virchow's triad is venous stasis; a dynamic study of venous return has already proven that this apparatus causes a pulsating blood flow. No studies discussing this issue were found in the Medline electronic database.

Conclusion

The RAGodoy® apparatus causes return pressures in the venous systems of lower limbs that may be utilized to prevent venous stasis.

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Design & Development of Lower Extremity Paediatric Prosthesis, a Requirement in Developing Countries

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Abstract

There are more than 10 million physically handicapped people in India. A majority of them belong to poor strata of the society. In the present condition prosthetic fitment centers are not sufficient to deal with such large amputee population. Children are mostly victim of society in low per capita income country in general. Children with congenital amputation, loss of limb with street accidents/trauma, frost bite etc need special attention for the prosthetic fitment. More than 80% of major amputations of the lower extremity are attributed to peripheral vascular disease¹. About 10 percent of congenital anomalies are treated as, or require, amputation². As children are in the growing age, the prosthetic device is required to be changed frequently. This accelerated rehabilitation greatly reduced the overall cost of the patient's care and returned them to full function much faster³. The major constraint in frequent change of prosthetic device in developing country is lack of sufficient number of prosthetic fitment center, skilled prosthetists, paediatric prosthetic kits and low income group of amputee. To face this challenge we have designed a low cost Paediatric prosthetic

Keywords: BK prosthesis, Biomechanic, Adjustable Prosthesis

Introduction

Although many prosthetic principles used in treating adults apply to the treatment of children as well, the child with a lower-limb deficiency presents the prosthetist with a unique range of considerations, both practical and philosophical. Most techniques used with adult amputees must be downsized, sequenced in degree of complexity, modified or completely altered to match the ever-changing needs of children⁴. A sequence of emotions occurs following a traumatic loss of a limb, amputation due to cancer or other disease, or birth of a child with a congenital absence^{5,6}. Each person holds an idealized image of the body, which he uses to measure the percepts and concepts of his or her own body⁷. According to Kolb⁸, an alteration in an individual's body image sets up a series of emotional, perceptual and psychological reactions. Although prosthesis design is a complicated process deals with many discipline including materials science, Prosthetic science, mechanical science, biomechanics etc., the case of children should to be handled very carefully. Child amputees must develop positive self-esteem and body image to achieve self-

acceptance. Body image includes physical, psychological and social aspects and is formed by constantly changing emotions and body perceptions⁹. Disturbances of one's body image occur when changes are not accepted or when previous images do not coincide with reality. If an amputee cannot acknowledge a missing limb, then he or she may never completely accept his or her body or situation.

In the present situation of India, there is no such design to suit children of lower limb amputation. Internationally also percentage of Trans Tibial Amputees (TTA) is more¹⁰. Most of designs including International Committee of the Red Cross (ICRC), Pyramidal, and Artificial Limbs Manufacturing Corporation (ALIMCO) etc are of general type to fit all age group in lower limb. At the growing age in children there is a need of change of prosthesis after 6 months or even earlier to keep the force distribution equal in both limbs and to avoid limb length discrepancy. As shown in figure 2, there was no scope of adjustment in growing children in an ortho-prosthesis. The prosthetic fitment is important in children from psychological point of view and is essential to deliver the prosthesis in a short time for school going children. In India there are insufficient government aided centers for

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prosthetic fitment. Prosthesis is being fitted in centralized locations in the urban areas so traveling cost for people coming for fitment is also a great factor. The cost of prosthesis is also a factor in low income group to do frequent change in children. An indigenously designed prosthetic kit with height adjustment for trans-tibial prosthesis was developed in our institute. The kit consists of an adjustable pylon, coupling device and foot ankle mechanism. The foot ankle mechanism consists of light weight rubber material and a polypropylene keel. The main objective of this development was to design a low cost, light weight and simpler height adjustable pylon with coupling device. The said adjustable pylon has been used for both TTA and congenital limb deficiency for making extension prosthesis in case of growing children. The design is very simple and innovative. It is designed in AutoCAD 2006 and simulated ANSYS®.

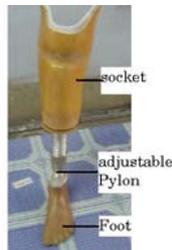


Fig. 1: Parts of Pediatric Prosthesis



Fig. 2: Non adjustable Ortho-prosthesis

Methods

Trans tibial paediatric prosthesis is a scientific mechanical device; the major parts can be categorized as socket, adjustable pylon and foot. The Parts are shown below in figure 1.

Socket is the interface between child’s stump and the prosthetic device and should be changed regularly during their growing age. In most of the conventional design the pylon is an aluminum pipe, stainless steel or titanium pipe and length of the pylon is fixed for a particular child. Feet are available in different sizes and can last for 2 to 3 years for a particular child. Generally for children when a socket is required to be changed, the pylon has to be changed if there is no scope of height adjustment. In case of extension prosthesis also the patient has to bear the cost of new pylon if no scope of height adjustability is incorporated. In figure 2, an ankle foot orthosis (AFO) containing extension with conventional pylon is shown, where there is no scope of height adjustment. In this paper, a height adjustable pylon with locking mechanism at any desirable height is discussed.

Selection and Description of Materials

By proper use of material and structural design, the shank deformability can be altered to mimic natural ankle joint

motions. At the same time, structural integrity should be maintained without permanent deformation and buckling of the prosthesis. Changes in shank flexibility may alter the stress distribution at the prosthetic socket-residual limb interface, which is related to the comfort perceived by the amputees¹¹. In general, two approaches exist for investigating shank deformation and its effect on socket-limb interface stress: experimental measurements and theoretical analyses. Experimental measurements require the use of stress/strain sensors attached to appropriate positions of the shank and the socket inner surface. Theoretical analyses such as finite-element (FE) methods, which have been widely used in lower-limb prosthetics in the past decade, can be useful to study the deformations and stresses. The advantage of the use of FE analysis is that stress, strain, and motion in any parts of the model can be predicted and parametric analyses can be performed easily without the need to fabricate prostheses. In previous FE models, the focus was on investigating the variation of stresses distributed at the limb-socket interface under different socket modifications^{12,13}, material properties of the sockets^{12,14} and liners¹⁵, and frictional properties at the interface¹⁶. We used linear, elastic, isotropic material property throughout the prosthetic model. Different materials were used for different portions of the model especially in the foot. High strength rubber, ordinary rubber, and wood were used for making the foot. Again steel (316-L)/aluminum/nylon was used for making the pylon portion of the model. Initially we designed prototype in aluminum and stress analysis made by ANSYS® under boundary conditions. Basically material selections depend on child weight and different weight range. Our experiment was tried on stainless steel, aluminum and Nylon plastic. Elastic properties (Young’s Modulus and Poissons ratio) of different materials used in the analysis are shown in the following table 1.

	Steel	Aluminum	Rubber	Wood	High Strength Rubber
Young's Modulus (MPa)	0.20530e6	74000	4	12000	6.9
Poisson's Ratio	0.3	0.35	0.45	0.21	0.24

Table-1: Material properties used in Pediatric prosthesis

Technical information

The Components of the Pediatric Prosthesis from top to bottom are

- 1) Socket Adopter
- 2) Socket Aligner Cup
- 3) Upper Shank
- 4) Lower Shank
- 5) Locking Knot
- 6) Foot Aligner Cup
- 7) Socket Fixing Bolt and Washer
- 8) Foot Fixing Bolt and Washer

The CAD drawing of various parts shown in figure-3

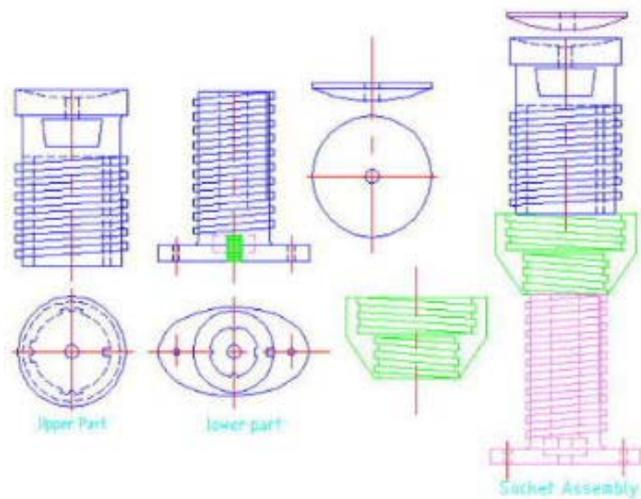


Fig. 3: Auto-Cad Drawing of Parts of adjustable Pylon

Prosthetic fitments were tried on Jaipur foot, Polyurethane (PU) foam foot and child size Solid Ankle Cushioned Heel (SACH) foot. The weight of adjustable pylon for different material is shown below in table 2. Stainless steel pylons were tried on adult patient.

Material	Stainless Steel	Aluminum	Nylon
Weight	1.390 gm	530 gm	400 gm

Table-2: Weight of Pediatric prosthesis in different material

Biomechanical Analysis

To calculate the effectiveness of design both static and dynamic analyses were made. The load limit of this design was tested in Regional Testing Center, Kolkata and observations are given in the results section. A dynamic calculation need completed calculation and scientific instruments¹⁷, a simplified model made from modeling software based on 3D free body diagram

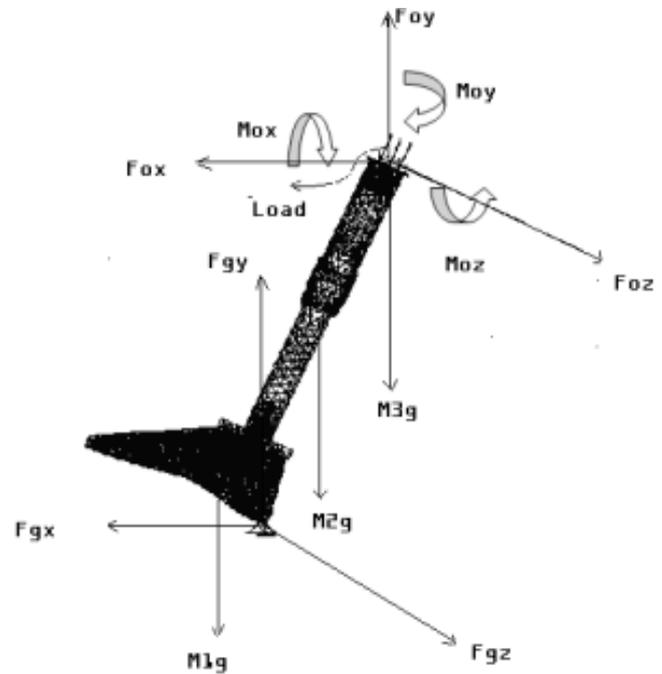


Fig. 4: Free body diagram of Model of Adjustable pylon

explained in figure 4.

F_{ox} , F_{oy} , F_{oz} are force component in X, Y,Z direction applied at the interface between socket adopter and adjustable pylon at the point "O"

M_{ox} , M_{oy} , M_{oz} are Moment component in same way

$$\hat{a} = \ddot{a} \hat{a} / \ddot{a}t \text{ and } \tilde{a} = \ddot{a} \hat{a} / \ddot{a}t$$

M_i ($i= 1,2,3,\dots$) = Segmental Mass . Shank Upper, Shank Lower and foot plus shoe

L_i ($i=1,2,3,\dots$) = Length of segment from the point "O".

F_{gx} , F_{gy} , F_{gz} are the ground reaction forces measured in force plate on foot.

X_g , y_g , z_g are the distance in x, y, z axes between the point of application of gravity and O

r- Distance form o to CG of whole device

I_o - Moment of Inertia about Z axis

$$M_{oz} - M_1 g l_1 \sin \acute{\alpha} - M_2 g l_2 \sin \acute{\alpha} - M_3 g l_3 \sin \acute{\alpha} + F_{gx} y_g + F_{gy} x_g = I_o \ddot{\alpha} \text{ ————— (1)}$$

$$M_{ox} + F_{gy} z_g + F_{gz} y_g = 0 \text{ ————— (2)}$$

$$M_{oy} + F_{gz} x_g + F_{gx} z_g = 0 \text{ ————— (3)}$$

$$F_{ox} + F_{gx} = (m_1+m_2+m_3) (r \tilde{a} \cos \acute{\alpha} - r \hat{a}^2 \sin \acute{\alpha}) \text{ ————— (4)}$$

$$F_{oy} + F_{gy} - (m_1+m_2+m_3) g = (m_1+m_2+m_3) (r \tilde{a} \sin \acute{\alpha} - r \hat{a}^2 \cos \acute{\alpha}) \text{ ————— (5)}$$

$$F_{oz} + F_{gz} = 0 \text{ ————— (6)}$$

Based on value of $m_1 = .175$ kg, $m_2 = .197$ kg, $m_3 = .875$ kg and lengths of different component for a particular prototype made up of aluminum the r and I_o are calculated.

Total Strength of coupling device and kinetic energy required to propel or walk for a child is also evaluated.

From the dynamic equations of both rotational and translational movement, the total force falling on interface of socket and adjustable pylon was simulated.

Statistics

For clinical trial participant mainly children from both sex and different age group were considered to check and bench mark the viability of the new design. Among them some of them were first time users.

Here only TTA statistics are shown; however we have fitted three extension prostheses and two trans-femoral (TF) without knee joint for children of age 5 to 12 years.

From the distribution graph shown in figure 5, it is seen that most of children fall under the age group of 9-12 and corresponding body weight of 20 to 35 kg.

Results

As per conditions of Assistance to Disabled Persons (ADIP) scheme by the government of India, a child can get a new prosthesis after one year free of cost if he/she belongs to below the poverty line income group. In the new design, only socket change and little adjustment in cosmetic can increase the life span of the prosthesis further without the need for discarding the prosthesis fully. The cost of socket and cosmetic cover can be treated as repair cost which under the scheme can indirectly help a lot of poor patients.

Out of 28 children, we have changed socket in following manner:

1. Two times in six month interval- 15
2. One time after three months interval-5
3. No change-5
4. Not Reported for follow up-3

The concept in pediatric prosthesis was tried on bilateral amputee also. As we know stability and confidence is most important in case of bilateral amputation, so height was adjusted from minimum to actual in a phased manner. From stability point of view lower height of CG means more stability. The cost of adjustable pylon in Nylon and Polypropylene is only Rs 200/- (Two hundred only), where as the conventional pylon with coupling device in India is Rs 800/- (Eight hundred only).

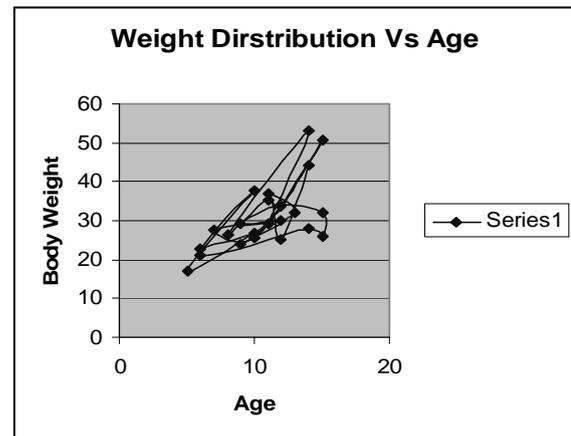


Figure-5: Age and Weight distribution of Subjects

Discussion

The commonly available endoskeletal prosthetic designs in India are from the following institutions

National Institute for Rehabilitation Training and Research (NIRTAR) Design

ICRC technology

Christian Medical College (CMC) Vellore

ALIMCO design (Pyramidal type)

Mobility India

Each of above design has its own advantages and disadvantages as it needs high skilled professional to fabricate align and fit. The electric and metal cutting tools are needed. There is no provision of height adjustment. It is also not suitable for children as far as the size and weight are concerned. Moreover, the long-term studies are not available on their usage. The proposed design appears to have advantage of simplicity, height adjustment and better load distribution. The New design is especially suitable for children and economically viable in countries with people having low socio-economic status.

In summary, the advantages of the new prosthesis are height adjustability, ease of fabrication, being light in weight, re-adjustability, reusability and low cost.

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A Study to Evaluate the Effectiveness of Phenol Blocks to Peripheral Nerves in Reducing Spasticity in Patients with Paraplegia and Brain Injury

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Abstract

Primary objective: To evaluate effectiveness of phenol blocks of peripheral nerves in reducing spasticity brain injured and spinal cord injured patients.

Secondary objectives: To measure the change in the range of motion after phenol blocks to peripheral nerves, to identify the electrophysiological changes and to study the cost effectiveness and side effects of phenol blocks.

Study design: Descriptive study

Setting: Tertiary referral centre, India.

Methods: This study was conducted from March 2000 to January 2002 among 20 patients with spasticity. Spasticity was measured by modified Ashworth scale and range of motion was measured with a standard goniometer on 1st, 7th, 14th and 21st days of the study. Nerve conduction studies, gait analysis, and functional independence measure was measured on 1st and 21st day of the study. Nerve blocks were done on 7th and 14th day of the study with 0.5% bupivacaine and 6% phenol in water respectively.

Results: 20 patients were included in the study, out of which 85% had spinal cord injury and 15% patients had brain injury sequelae. Spasticity measured by modified Ashworth scale, showed a statistically significant reduction with neurolysis. Following obturator neurolysis abduction of hip joint improved significantly and with posterior tibial neurolysis there was significant improvement in dorsiflexion and plantar flexion range of the ankle joint. Functional improvement measured with the FIM score also showed statistically significant improvement after neurolysis. H reflex amplitude was significantly reduced following neurolysis. There was a statistically significant reduction in the consumption of systemic medications for spasticity following the injection.

Conclusion: Range of motion in neighboring joints improved significantly after blockade of spasticity using Phenol neurolysis. There was statistically significant reduction in the amplitude of the H reflex. There were no major adverse effects following neurolysis with phenol and it was found to be significantly cost effective when compared to systemic antispastic medications.

Key words : Phenol blocks, spasticity, spinal cord injury, H reflex.

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Introduction

Spasticity is a velocity dependant increase in tonic stretch reflex and exaggerated tendon jerk resulting from hyper excitability of the stretch reflex¹. It is one of the most disabling aspects of brain and spinal cord injury. This needs to be treated if it interferes with activities of daily living, self care or when it causes discomfort or pain². Common measures to control spasticity include passive stretching, serial casting, orthotics, medications, interventions such as nerve blocks, intrathecal blocks^{3,4}, intrathecal medications, blockade of neuromuscular junction with botulinum toxin injections, surgical neurectomies⁵ and tendon releases⁶. Many of these procedures are expensive and require a hospital set up to implement. Chemical neurolytic agent 6% phenol is a widely available drug which is inexpensive and has a wide margin of safety.

This study was undertaken to evaluate the effectiveness of phenol nerve blocks in the reduction of spasticity and to study the side effects and cost effectiveness when compared to orally administered systemic antispastic medications.

Materials and Methods

This study was conducted in the Department of Physical Medicine and Rehabilitation at a tertiary care teaching hospital during March 2000 to January 2002.

Inclusion criteria:

1. Patients who were observed to have disabling spasticity, at least 6 weeks after the onset of the lesion.
2. Spasticity in adductor group of muscles of the hip causing difficulty in performing activities of daily living or spasticity in the gastrosoleus group of muscles resulting in difficulty in walking or sitting in a wheelchair

Exclusion Criteria:

1. Comatosed patients.
2. Patients who could not give an informed consent, patients on anticoagulants,
3. Patients with renal calculi, vesical calculi, ingrowing toe nails, pressure ulcers, pneumonia or heterotopic ossification as these could cause increase in spasticity

This study was approved by the research committee of the institution and all patients were included in the study following an informed consent. They continued to have their rehabilitation programme depending on their medical condition. Department of Pharmacy of the institution provided ampoules of 6% phenol in water and 0.5% Bupivacaine. Bupivacaine was injected on day 7 and 6% phenol in water was injected on day 14 of the study.

Measurements: Following measurements were done:

1. Spasticity was measured by modified Ashworth scale⁷.

2. Range of motion was measured with a standard goniometer. Spasticity and range of motion were measured on days 1,7,14 and 21. On day 7 and day 14 spasticity and range of motion were measured one hour before and one hour after the intervention.

3. Electrophysiological parameters related to gastrosoleus: H reflex - latency, H reflex - amplitude, M wave – amplitude and H: M ratios were measured at the beginning and at the end of the study. Mystro + EMG/NCS machine was used for measurement.

4. The cost of antispastic medications that patient was taking through out the study period was recorded.

5. Any side effects following the injections were recorded.

6. Functional independence measure related to self care and locomotion was scored at the beginning and at the end of the study.

Technique of the nerve block: The nerves to be blocked were located using a needle electrode connected to an electrical nerve stimulator using a connecting wire wound around its base. The drug was injected to this nerve under strict aseptic precautions. The fibers intended for blockade was identified by stimulating the nerve. The intra neural topography of the fibers served as a guide during the stimulation⁸. For stimulation, a direct current lasting 0.05-0.1msec with a current strength of 3-5mA was used at the rate of 0.5-3Hz. Once the desired nerve was identified with minimal current, 3ml of solution was injected.

Obturator Nerve Block: With the patient supine and hip in maximum abduction, the adductor longus tendon was identified and the needle was directed posterior to the adductor longus muscle, approximately 3 cm below the pubic tubercle. To locate the posterior branch of the obturator nerve, needle was directed posteriorly from the adductor longus tendon towards the ischial tuberosity.

Posterior tibial Nerve Block: The patient was positioned in the prone position. The needle was inserted at a point 3 cm proximal to the popliteal crease lateral to the midline in the popliteal fossa.

Cost of antispastic medication

1. Tab Valium 5mg Rs.1/-
 2. Tab Tizanidine 2mg Rs.7.50/-
 3. Tab Baclofen 10mg Rs.10/-
- Cost of injection phenol Rs.70/-

Results

Among the 20 patients included in this study, there were 18 males and 2 females. The spasticity was due to spinal cord injury in 17 patients, and following brain injury in 3 patients.

Spasticity was measured using modified Ashworth scale.

On day 1, Grade 3 spasticity was present in 16 patients and Grade 4 spasticity in 4 patients. After neurolysis with 0.5% Bupivacaine and 6% phenol respectively on 7th and 14th day, spasticity was reduced to Gr.0 in three patients and Gr.1 in 14 patients (p=0.00) (Table 1).

Day 1			
Mean	SD		
3.20	0.41		
Day 7			
Before Bupivacaine		After Bupivacaine	
Mean	SD	Mean	SD
3.20	0.41	0.25	0.44
Day 14			
Before Phenol		After Phenol	
Mean	SD	Mean	SD
3.20	0.41	0.80	0.52
Day 21			
Mean	SD		
0.80	0.52		
p-value: 0.000*			

Table 1: Spasticity as measured by Modified Ashworth score before and after Neurolysis (*statistically significant)

Range of motion: Thirteen patients had limited range of hip abduction because of adductor spasticity. After neurolysis of obturator nerve with 0.5% bupivacaine on 7th day, range of motion improved to twice the pre-injection range but reverted back to base line value within a week. After neurolysis with phenol on 14th day the abduction range doubled and this effect persisted on 21st day. These results were statistically significant with a p value of 0.00.

There was no change in hip flexion, extension and knee flexion range in these patients. Seven patients had limited dorsiflexion of ankle due to gastrosoleus spasticity. On the 7th day after neurolysis of posterior tibial nerve with 0.5% bupivacaine there was significant improvement in dorsiflexion of ankle but this effect did not last till 14th day. After neurolysis with phenol on 14th day, ankle dorsiflexion range improved again and this effect was persistent at 21st day (p=0.00). Ankle plantar flexion range also improved in these patients (p=0.002) (Table 2).

Functional Independence Measure: All patients included in this study were assessed for ADL independence which was measured with FIM. Feeding, grooming, bathing, toileting, upper-half dressing & lower-half dressing were measured as a part of self care activities. In locomotor activities, walking/wheel chair activities and stair climbing were measured. 9 patients were fully dependant in activities of daily living and 11 patients were partially dependant. All patients showed

Variable			Hip F	Hip E	Hip Abd	Hip Add	Knee F	Ankle DF	Ankle PF
Day 1		Mean	108	7.25	12.25	24	123.85	11.50	24.29
		SD	12.42	5.00	10.70	6.00	6.50	11.90	7.32
Day 7	Before Bupivac	Mean	108	7.25	12.25	24	123.85	11.50	24.29
		SD	12.42	5.00	10.75	5.98	6.50	11.82	7.32
	After Bupivac	Mean	108	7.25	31.50	25.50	123.85	23	34.29
		SD	12.40	5.00	5.87	6.86	6.50	8.01	7.87
Day 14	Before Phenol	Mean	108	7.25	12.25	24	123.85	11.50	24.29
		SD	12.42	5.00	10.10	5.98	6.50	11.10	7.32
	After Phenol	Mean	108	7.25	27	25.50	123.85	23	34.29
		SD	12.42	5.00	4.70	6.86	6.50	8.013	7.87
Day 21		Mean	11.0	7.25	27	25.5	123.85	23	34.29
		SD	14.31	4.99	4.70	8.63	6.50	8.01	7.87
p-value			0.33	1.11	0.00*	0.08	0.33	0.00*	0.002*

TABLE 2: Range of motion in hip and knees before and after neurolysis.

Abbreviations used in table: *statistically significant. F=Flexion, E=Extension, Abd=Abductors, Add=Adductors. DF=Dorsiflexion, PF=Plantar Flexion, Bupivac=Bupivacaine

significant improvement in self care and locomotion. Patients who received blocks to obturator nerve showed significant improvement in self care activities and patients who received posterior tibial blocks showed significant improvement in locomotion (p=.005) (Table 3).

Variables	Day 1		Day 21		P Value
	Mean	SD	Mean	SD	
Partial FIM Score	28.25	14.90	34.30	14.14	0.005*

Table 3: Modified FIM scores before and after neurolysis. *stastically significant

Electrophysiological Data: H-reflex latency, amplitude, M-wave amplitude and H: M ratios were measured on the 1st day and 21st days of the study. H- Reflex amplitude showed a significant decrease following phenol injections (p=0.04) but H: M ratio and H-reflex latency were not significantly changed on comparing the results with the t-test for paired samples. (Table 4)

Evaluation of cost of antispastic medication: All the patients who were included in the study were taking antispastic medications through out the study period. 4 patients were using a combination of oral Baclofen and Tizanidine, 6 patients were using a combination of Diazepam and Tizanidine, 7 patients were using only

Variables	Day 1		Day 21		P Value
	Mean	SD	Mean	SD	
H reflex (Latency) msec	28.62	8.10	229.88	3.90	0.48
H reflex amplitude (mv)	416.32	426.7	239.68	294.49	0.04*
M wave amplitude (mv)	6.90	5.53	9.64	18.73	0.57
H : M ratio	0.16	0.17	0.11	0.099	0.29

Table 4: Electrophysiological parameters before and after neurolysis

Variables	Day 1		Day 21		P Value
	Mean	SD	Mean	SD	
Cost of antispastic drugs	31.09	28.74	27.72	30.64	0.02*

Table 5: Cost of medicines used (in rupees) before and after neurolysis. *statistically significant

Tizanidine and 3 patients were using only Diazepam. Following nerve blocks there was reduction in consumption of systemic drugs in 9 patients, and there was a significant reduction in cost of medications (p=0.023) (Table 5).

Side effects of Phenol: All patients were followed up until the end of the study to evaluate side effects for phenol blocks. No adverse effects as described in the literature were noted.

Discussion

Spasticity is one of the most disabling symptoms in patients with upper motor neuron syndromes like spinal cord injury and brain injury. It can cause pain and muscle shortening which is a major source of disability. The main goals of treatment are to reduce the deforming force as a result of spasticity, to improve function and prevent secondary complications due to spasticity.

Spasticity can be treated with physical modalities, oral medications, surgical methods and chemical neurolytic agents. Physical modalities commonly used are prolonged stretching, casting, orthotics, biofeedback and electrical stimulation. These physical methods are labour intensive and often provide only transient relief. The advantage of oral medications is that it can be used to reduce generalized spasticity but most of these medications are expensive. Side effects are common when these drugs are administered for long periods. A number of surgical procedures can be under taken for reducing spasticity but these procedures are expensive.

Chemical neurolytic agents like ethyl alcohol and phenol⁹ are options for decreasing localized spasticity. Ethyl alcohol in higher concentration selectively denatures the proteins and injures cells by precipitating and dehydrating protoplasm⁹. It is easily available but its disadvantages include skin irritation, permanent peripheral nerve palsy and painful muscle necrosis. Neuromuscular junction blocking agents like Botulinum toxin¹⁰ exerts a paralytic effect by rapidly and strongly binding to presynaptic cholinergic nerve terminals. It is very expensive and this often prevents use of this drug.

Phenol¹¹ (benzyl alcohol) is the major oxidized metabolite of benzene. Khalili¹² and colleagues performed perineural injections and Awad¹³ pioneered intramuscular injections of phenol. Phenol when used for neurolysis denatures protein causing tissue necrosis. Wallerian degeneration occurs approximately 2 weeks following the injection and eventually there is re-growth of most of the axons. The duration of action of phenol blocks has been reported to be approximately 10-11 months using 2-3% Phenol. For the tibial nerve, Petrillo¹⁴ et al showed an average of 13 months improvement using 5% phenol. Keenan et al¹⁵ reported an average duration of improvement of 5 months

for Musculocutaneous7 nerve. Well controlled studies have in general reported an average duration of effect of phenol nerve block as 6 months.

In our study, 20 patients with spasticity following spinal cord injury or brain injury were treated with nerve blocks, either Obturator nerve block (13 patients) or Posterior tibial nerve blocks (7 patients), All of them showed significant but transient reduction of spasticity after the injection of 0.5% Bupivacaine on the 7th day of the study but there was a recurrence of spasticity as its effect was of short duration. After giving phenol nerve blocks on 14th day, reduction in spasticity was observed on the same day and this continued till the end of the study on the 21st day. From these results it is inferred that 0.5% Bupivacaine is a short acting agent whereas 6% phenol reduces spasticity for more than seven days. As spasticity decreased, there was definite improvement of range of motion in the neighboring joints. 13 patients showed consistent improvement in hip abduction range after giving bupivacaine injection and phenol injections to the Obturator nerve. The increased hip abduction range helped them in positioning, maintaining proper perineal hygiene and in self care activities like toileting and lower half dressing. It also helped in proper ambulation by decreasing the scissoring of the gait. The 7 patients who received injections to their Posterior tibial nerve showed significant improvement in dorsiflexion range which helped them in sitting, walking and climbing stairs.

Several standard physiological tests were used to assess spasticity of which H-reflex amplitude and H: M ratio have been shown to change in spasticity. Katz et al¹⁶ showed increased H:M ratios in spasticity following spinal cord injury. In our study H amplitude was significantly diminished post phenol injection but H: M ratio was not significantly affected. H reflex amplitude can be used as an indicator of effectiveness of phenol block.

The common side effects of phenol blocks reported in literature are burning sensation and dysaesthesia. When phenol is injected into a vessel it can lead to thrombosis, ischemia and tissue sloughing. An overdose can cause tremors, central nervous system depression, and cardiovascular collapse. None of the patients included in our study group had any side effects as described in the literature.

Conclusions

Phenol block to peripheral nerves reduces spasticity in persons with spinal cord or brain injury. There was statistically significant improvement in range of movement in joints after nerve blockade using 6% phenol and 0.5% bupivacaine but the effect with bupivacaine was short lived. There was a reduction in H-reflex amplitude after the phenol blocks. Chemical neurolysis with phenol is a

safe and cost effective method to reduce spasticity and to improve functions in patients with spinal cord injury and traumatic brain injury.

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Catatonia and Multiple Pressure Ulcers: A Rare Complication in Rehabilitation Setting

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Abstract

An eighteen years old boy reported with a continuous course illness characterized by features of catatonia secondary to severe depression with multiple pressure ulcers over sacrum and heels. Ulcers were effectively managed by a team of physiatrist, psychiatrist and rehabilitation nurses. Immobility, reduced nocturnal movements, increased skin fragility and poor nutrition contributed to the development of the pressure ulcer in bed bound patients. Efforts should be directed towards prevention of pressure ulcers to reduce additional morbidity. Key Message: First case to be reported of a patient with catatonia secondary to depression having multiple pressure ulcers.

Key words: catatonia, depression, pressure ulcer, rehabilitation

Introduction

Pressure ulcer is best described as “an area of unrelieved pressure over a defined area, usually over a bony prominence, resulting in ischemia, cell death, and tissue necrosis¹. Pressure due to immobility is the most important risk factor in the development of pressure ulcer. However, no case is reported till date in literature of pressure ulcer in a patient with catatonia. We report a case with multiple pressure ulcers secondary to immobility due to catatonia in a patient with severe depression and how he was managed by combined efforts of a multidisciplinary team.

Case Report

An 18 years old man with no significant past, personal or family history with well adjusted pre-morbid personality presented with an acute onset continuous illness characterized by low mood and withdrawn behavior for

last nine months, mutism, staring and stereotypic behavior with posturing, reduced oral intake, and negativism for three months and multiple ulcers over back and heels for last one month. The symptoms started while he was preparing for his board exams and worsened when he was unable to perform well in the examinations. At evaluation he was apathetic and had open eyes with fixed gaze but no emotional responsiveness and reaction to stimuli. He was mute with no spontaneous acts and no rigidity. He was poorly kempt and had asthenic built. Systemic examination was normal. He had three pressure ulcers (details follow). He was diagnosed as a case of catatonia with severe depression and multiple pressure ulcers. Routine haemogram and biochemistry were within normal limits. He received oral benzodiazepines (Tab. Lorazepam 2mg three times a day), antibiotics (Cap. Amoxicillin 500mg three times a day) and vitamin supplements. He was referred to rehabilitation department for the management of pressure ulcers. He had three pressure ulcers - one rectangular shaped, grade III ulcer over sacral region 5.0 X 2.5cms in size, clean and granulating (Figure 1), and two circular ulcers over bilateral heel grade II 1cm in diameter with necrotic slough

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Fig. 1. Sacral ulcer



Fig. 2. Bilateral Heel Ulcers

(Fig. 2). Wound swab cultures showed growth of *Enterobacter* species sensitive to amoxicillin. There was no evidence of osteomyelitis on X-rays of pelvis and ankle and foot. He was put on conservative regimen of management consisting of nursing on water mattress, proper bed positioning, regular pressure relief, daily debridement and dressing of pressure ulcers, and appropriate antibiotic as per the culture along with continuation of the supportive medications. Catatonic features responded initially to benzodiazepines but later electroconvulsive therapy was initiated and seven sessions were conducted. Patient responded well to the combined approach and was shifted to oral anti-depressant (Cap. Fluoxetine 20 mg once a day) and was discharged after an inpatient stay of over eight weeks. At the time of discharge, he was euthymic with adequate oral intake, taking medications regularly and all pressure ulcers were completely healed.

Discussion

The incidence of pressure ulcer in hospitalized patients ranges from 2.7% - 29%, and prevalence from 3.5% -

69%². Prevalence of pressure ulcers in psychiatric hospitals ranges from 1.4 – 3.8% in older people above 65 years and 0.0 - 0.8% in younger patients³. The common causes for development of pressure ulcer in patients with psychiatric diagnosis are: impaired consciousness, dementia, Parkinson's disease⁴, depression⁵, altered psychological behavior or splint usage in psychotic patients⁶. A common factor in all these conditions is immobility, leading to prolonged unrelieved pressure, tissue ischemia and cell death.

Pressure ulcers are caused by the interaction of multiple, diverse, etio-pathological factors that can be classified as patho-mechanical or patho-physiological⁷. Common patho-mechanical (extrinsic or primary) factors are prolonged pressure and immobility along with shear and friction, where as fever, anemia, malnutrition, decreased lean body mass and neurological disease are common patho-physiological (intrinsic or secondary) factors.

Immobility in bed tends to cause pressure ulcers on occiput, sacrum, heels, malleoli, and trochantric regions⁸. Our patient had ulcers over sacrum and heel. Nocturnal movements associated with sleep tends to decrease as hospital stay increases⁹ and analysis of periodic body movements in persons at risk for pressure ulcers suggest a relationship between spontaneous body movement and the development of pressure ulcer¹⁰. Our patient developed ulcers before admission to the hospital but must have had reduced body movement at night. There is increased association of skin fragility and poor healing with an altered psychological behavior. This combination of vulnerability to recurrent pressure sores in association with the pathological intellectual debility is described as 'ectodermic syndrome'⁶ that might have also contributed to ulcer generation in our patient. Our patient had lean body mass (BMI-19, low normal) but haemoglobin (12.6gm/dl), serum albumin (3.9gm/dl), and absolute lymphocyte count (2240/cumm) were within normal range suggesting minimal contribution from patho-physiological factors in ulcer development in spite of reduced oral intake for last few weeks.

It is imperative to treat the patient's medical condition that predisposes to pressure ulcers. If possible, the patho-physiological factors should be controlled in conjunction with the elimination of the patho-mechanical factors. In our case, medications and electroconvulsive therapy was started to eliminate the primary pathology by the psychiatrist and the rehabilitation team provided proper care of the ulcers by conservative regimen consisting of appropriate medications, dressing and advice for proper nursing care for controlling the physiological factors and early healing of the ulcers.

The incidence of pressure ulcers in patients with psychiatric illness, especially with catatonia might be more

than what is reported in the literature. Pressure ulcers significantly increase length of stay, morbidity and the cost of management. All efforts should be directed towards prevention of pressure ulcers in bed bound patients to reduce additional morbidity.

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Acupuncture as a Modality in Low Back Pain

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Abstract

32 years married muslim female having chronic low back pain for four years was treated in the Department of Physical Medicine, Burdwan Medical College, West Bengal in the year 2005. Patient could not tolerate NSAIDS due to recurrent peptic ulcer. Physiotherapeutic exercises and management with Ultrasonic therapy had to be withdrawn due to nausea and vomiting reported by the patient. Patient was then put on Acupuncture treatment. There was remarkable improvement with Acupuncture within 2 months. Exercise therapy and advice regarding posture care was continued along with acupuncture therapy.

KEY WORDS: Low Back Pain, Acupuncture

Introduction

Low back pain is a common ailment in the practice of Physical Medicine and is a leading cause of loss of (LBP) working days.¹ Everybody experiences LBP once or twice in his/her life. Majority of LBP cases improve without treatment.^{2,3} A numbers of cases improve with medical treatment within a few days. In refractory cases facet joint injection, epidural infiltration and even neurosurgical intervention are needed. But these types of invasive treatment are not available in primary level of hospitals. So a search is done for a modality which is available in primary setup, not costly and can be administered by attending physician with a little training. Acupuncture is such modality which has some scientific basis.⁴

Burdwan Medical College, West Bengal has one Acupuncture unit. One refractory case of chronic LBP, where NSAIDS could not be administered and usual physiotherapeutic heat therapy could not be continued, was advised Acupuncture treatment. Before starting of Acupuncture treatment patient could not walk without assistance due to pain and spasm. There was remarkable improvement and the patient could do usual ADL activities independently within 2 months of Acupuncture therapy.

Case Report

A 32 yrs married muslim lady, resident of Burdwan district of West Bengal, attended OPD of dept. of Physical

Medicine with the main complaints were LBP for 4 years and a feeling of tremors of both lower limbs for 4 months.

There was no history of trauma. Bowel and bladder habit were normal. There was no involvement of any other joints or morning stiffness.

Her 1st conception resulted in premature delivery at 7th month of pregnancy. The baby died 3 days after delivery. Incompetence of uterus was diagnosed as the cause. Thus Shirodkar's operation was done following her 2nd and 3rd pregnancy. The second baby was a female delivered in the year 1993 and still alive.

Whole episode started following her 3rd conception. The patient noticed cessation of movement of the baby at 6th month of pregnancy. Planned abortion was conducted at 7th month of pregnancy. After the abortion, menstrual flow became painful and foul smelling. Lower abdominal pain and low back pain started 4 months after the abortion. For the last 9 months, abdominal pain gradually decreased in intensity but low back pain increased in intensity.

Patient had past history of migranous headache since her childhood for which she used to take paracetamol as self medication.

The patient suffered from pain abdomen with passage of black stool twice, first in the year 1995 following ingestion of some tablet for headache and again in the year 2000 after taking some NSAID for toothache. She was treated for peptic ulcer and was advised to avoid pain killer.

On 22.9.2005, she first attended urology dept. of Medical College Hospital, Kolkata, for accidental finding of stone

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in right kidney in X-ray of lumbosacral spine done for low back pain. From there she was referred to orthopaedic dept. and finally to Physical medicine dept. of Medical College Hospital, Kolkata. From the dept. of Physical Medicine of Medical Hospital, Kolkata she was advised to attend dept. of Physical Medicine Burdwan Medical College, Burdwan as patient was a resident of Burdwan district. Patient first reported at the dept. of Physical Medicine of Burdwan Medical College, Burdwan on 15.10.2005.

She was helped by two of her relatives to walk to the examination room. She could not move her spine due to pain. On examination there was guarding of lumbar spinal movement due to pain and spasm but no neurological deficit was detected. No tremor or fasciculation of lower limbs was noted. Bowel and Bladder were not involved.

X-ray L.S Spinal on 4.9.05 showed early degenerative changes along with suspected kidney stone on the right side. UGS lower abdomen done on 15.9.05 showed right sided nephrolithesis. X-ray KUB done on 23.11.05 after treatment at Urology dept of Medical College, Kolkata showed no evidence of any radio opaque calculus in right kidney.

Thyroid function test done on 7.9.05 showed TSH level at 4 μ u/ml. Fasting blood sugar on 21.12.05 was 76 mg/dl. Blood examination done on 24.12.05 showed TLC 4100 and ESR 11 mm after first hour.

MRI of L.S. Spine on 3.10.05 reports posterior annular bulge of L4-L5 disc causing pressure on both existing nerves and thecal sac. Height and hydration of all lumbar i.v. discs were almost maintained. Lumbar vertebrae are normal in height with few osteophytic spicules and end plate changes. Minimal grade 1 anterior spondylolisthesis of L5 over S1 is seen. No evidence of any infective or metastatic lesion was seen.

On her 1st visit in dept. of Physical Medicine, Burdwan Medical College, She was advised to take absolute bed rest for one week. Lumbo-Spinal brace was advised. Ultrasonic therapy to low back was also advised.

Patient could not tolerate ultrasonic therapy. On 1st day of therapy she noticed nausea. After 3rd day of therapy, she suffered from repeated vomiting. Ultrasonic therapy was continued but vomiting increased in intensity. On enquiry it was revealed that patient suffered from nausea even on application of dry heat in lower back. So ultrasonic therapy was withdrawn.

After one week there was some improvement of pain but still patient could not walk independently. NSAIDS could not be prescribed as for past history of malena.

So there was search for alternate treatment. Acupuncture was considered and a try was given.

Proper consent was taken from the patient before starting Acupuncture treatment. Acupuncture therapy was started on 23.11.2005. Proper aseptic measures were followed. Acupoints selected were along paraspinal region and lower limbs following principles of anatomical acupuncture. Initially only manual stimulation of the inserted needle and hammering of lower back were done. On the 4th day of treatment, electrical stimulation of the needle (Electroacupuncture) was added.

Selected points were UB23, UB25, UB54, UB40, GB30, GB34, and UB60. UB stand for Urinary Bladder Channel and GB stands for Gallbladder Channel.

Initially, alternate day therapy for 20 minutes for 12 sittings was done. Then there was a gap of 7 days. Then biweekly treatment was continued for 4 weeks.

Patient was evaluated for subjective and objective changes. For pain VAS scale (0-10) was used. Patient was evaluated initially before starting of acupuncture treatment, at completion of alternate therapy and finally after completion of biweekly therapy.

Results

At the initiation of the acupuncture treatment, there was excessive pain (Score 10 on a numeric scale) which was lessened to a great extent at the end of alternate day therapy (Score 5). After completion of acupuncture treatment there was minimal pain left. (Score 2)

Before initiation of acupuncture treatment, patient was not able to move her spine due to pain and spasm. Independent standing or walking was not possible. After completion of therapy patient improved so that she could flex her lower spine to some extent with pain. After completion of treatment, patient improved to a great extent so that she was able to do her ADL activities independently with minimal difficulty. She was even able to cross railway over bridge independently.

Discussion

Acupuncture is a component of Traditional Chinese Medicine (TCM).⁵ Acupuncture originated in china in prehistoric times. The word 'acupuncture' comes from two Latin words 'acus'(needle) and 'punctura'(puncture). In TCM (Traditional Chinese Medicine), a disease process is thought to be due to disharmony between two opposite forces (yin and yang) and flow of qi. Qi is considered to be vital force concentrated in bilateral pathways or channels called meridians that run longitudinally throughout the body.⁶

The acupuncture would be used to bring yin and yang into balance or to release the stagnation of qi.⁷ This is achieved by inserting thin, noncutting needles along the

meridians into specific points called acupoints.⁶

Researchers have considered acupuncture to be a form of neuromodulation. There are two theories regarding pain control achieved by acupuncture. First, acupuncture may stimulate large sensory afferent fibers and suppress pain perception as explained by gate control theory of pain. Second, the needle insertion may act as noxious stimuli and induce endogenous production of opiate like substance to effect pain control.⁴

According to Yellow Emperor,s Classic Internal Medicine, there are 360 acupoints corresponding with 360 days in a year(according to Chinese lunar calendar), but thorough searching reveals only 295 acupoints. The acupoints are organized essentially into 12 meridians (channels) to coincide with the ancient Chinese system of 12 time intervals in the day.⁷

Manual stimulation of the inserted needle is done to generate De. Qi. Sensation, which is considered essential for achieving result of acupuncture treatment. De Qi is usually described as a heavy, numb, aching feeling that is produced when needle enters a acupuncture point. Joseph and Linda concluded that it is not necessary to create this sensation to achieve acupuncture in anatomical basis. Anatomical Acupuncture is the practice of acupuncture using the knowledge of modern anatomy, physiology and pathophysiology. This approach has been developed since 1970 by Dr. Joseph Y Wong. Electroacupuncture is a method where acupuncture needle are stimulated by electrical current instead of manipulation by hand.⁸

In low back pain with or without sciatica, combination of local and distal acupoints is selected.⁹

In the present study, anatomical acupuncture was used. The points selected were paraspinal in lumber spine and on the lower limbs.

Osler, one of the great physician of modern medicine indicated effectiveness of acupuncture in the treatment of lumbago.⁶ In a study by Geenfield, 220 patients with the chief complaints of the syndrome of LBP due to various causes, after acupuncture 59% had a reduction of pain to a barely perceptible or zero level lasting from a minimum of 3 months to no recurrence at all.¹⁰

In the present study, NSAIDS could not be used due to past history of precipitation of peptic ulcer twice following ingestion of drugs for pain. In addition, Ultrasonic or heat therapy could not be continued for precipitation of nausea and vomiting. Nausea and vomiting as a side effect of ultrasound therapy on lower back had not been recorded earlier by any observer.

Conclusion

Low Back Pain is common so far as experience of the physician as well as of patient is concerned. We sometime

meet patients where NSAIDS could not be administered either due to GI problem or due to intolerance of the patient. In addition physiotherapeutic modality could not be applied due to intolerance as in the case studied. In some rural set up even basic physiotherapeutic setup is not available. In those setting Acupuncture can come into rescue of the attending physician. Acupuncture can be considered as a modality which has some scientific basis and which could be learned by doctors with few months of training. Further exploration of possibility of utilization of Acupuncture in pain management and other areas of rehabilitation medicine is needed.

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Salvaging a Psycho-Flexed Hand

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Abstract

A 35 years old lady presented with clenched fist with the background of a psychiatric symptoms. Examination revealed psychotic features with predominant negative symptoms and secondary contracture of left hand. Presumptive diagnosis of psycho-flexed hand was made and referred to department of Psychiatric and Neurological Rehabilitation. Manipulation under anesthesia, corrective casting, splinting, local electrotherapy, physiotherapy and occupational therapy are established methods of managing contractures in rehabilitation medicine. When contractures of hands are identified in patients with psychiatric illness, same principles can be utilized and can be managed effectively by combined and co-coordinated efforts of a multidisciplinary team.

Key words: contracture, hand, psycho-flexed, psychosis, rehabilitation

Introduction

The term "Psycho-flexed hand" was coined by Frykman et al ¹ in 1983 when they reported few cases of hand deformities in patients with psychiatric illness. To our knowledge there are very few similar reports in literature. We report a rare case ^{1,2} of hand deformity secondary to psychosis, and discuss management approach to salvage her hand.

Case Report

A 35 years old married lady presented with complaints of clenched fist bilaterally and swelling of both hands of 4-week duration. She also had disruption of sleep, reduced appetite and decreased self-care for 6-8 weeks, muttering to self for 2 years, and suspicious behavior and fearfulness for last 2-3 years. She was a housewife from a rural background with no formal education with well adjusted pre-morbid personality. She was poorly kempt, did not make eye-to-eye contact, was continuously muttering to self and had fisting of both hands. She exhibited active negativism, apathetic behavior and restricted affect. Formal assessment of speech, mood, thought and

perceptual abnormalities could not be carried out due limited participation by the patient for detailed examination. She was referred to the department of psychiatric and neurological rehabilitation for evaluation and management of the hand deformity. Examination revealed both hands in fisted position but intermittent opening of right hand. There was no evidence of spasticity or dystonia. The left hand had swelling, pitting edema, foul smelling discharge, tenderness on palpation and raised temperature. She resisted opening of the left hand and on forceful opening revealed crusting and fissuring of web spaces and contractures at metacarpo-phalangeal (MCP), proximal (PIP) and distal inter-phalangeal (DIP) joints of all four fingers and adduction contracture of thumb (Figure 1). Bunnel- Littler testing suggested tightness primarily of the intrinsic muscles of hand and capsule of MCP and PIP joints. Long finger flexors were also tight.

Presumptive diagnosis of schizophrenia with predominant negative symptoms and secondary contracture of hand was made. There was no evidence of dystonia or fracture. Abnormal posturing of hand was considered a part of the psychopathology as relatives gave history of patient holding a leaf in her hand and telling that it was her treasure and thereby would not open her hand. The swollen, tender hand with contractures had features

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Fig 1. Sequence of events: Clenched fist with contracture (At presentation), wrist cock up cast, hand opening with dynamic contracture at metacarpophalangeal and interphalangeal joints (At cast removal), and full range of motion at all joints of hand (At discharge)

suggestive of cellulitis along with secondary deformity due to prolonged closed fist position. Her hemogram revealed: haemoglobin -11.9 gm%, total leukocyte count 8100/cumm, polymorphs-64%, lymphocytes-34%, and eosinophils-2%, ESR-45 mm after 1hr, and platelets-3,56,000/cumm. Serum chemistry showed reduced total proteins of 5.9 gm/dl (N> 6.5gm/dl) and low albumin of 3.1gm/dl (N>3.5gm/dl) suggestive of poor nutrition. Rests of the biochemical parameters were within normal range. Rheumatoid factor and antinuclear antibodies were absent. X-ray of both wrists and hands didn't show any abnormality.

Antipsychotic medications were started (Tab. Risperidone upto 6mg and Tab Lorazepam upto 4mg per day). Local dressing and wound cleansing was tried through the side of the closed left hand along with oral antibiotics (Tab. Ampicillin 250 mg + Tab Cloxacillin 250 mg thrice daily) and anti-inflammatory agents (Tab. Diclofenac sodium 50 mg + Tab Serratiopeptidase 10 mg thrice daily). After ten days of antipsychotics, antibiotics, and anti-inflammatory medications she still did not open her left hand and required examination under sedation. There was improvement in skin condition but had significant tightness of intrinsic muscles and capsule of MP and PIP joints and long finger and wrist flexors. A cock - up wrist cast was applied: wrist in 30 degrees of extension, thumb in abduction, MP joints in flexion and PIP and DIP joints in extension (Figure1) but due to inadequate relaxation, full correction could not be achieved. The objective was to keep the hand in functional position and to stretch the tight intrinsic muscles of hand, wrist and finger flexors. The cast was changed after one week. The second cast was applied under general anesthesia to get adequate muscle relaxation. The skin condition had improved further with healing of fissures and no evidence of foul smell or discharge. She still had tightness of intrinsic muscles and capsule but long flexors were stretchable. Cast was reapplied in maximally corrected position.

Her psychotic symptoms improved only minimally and therefore four days after the application of second cast, Electro Convulsive Therapy (ECT) was started. After two ECT sessions, she had distinct improvement in psychotic symptoms. A total of seven sessions of ECT were given over a period of one month. Considering improvement in her negative symptoms and improved self-care, the second cast was removed after two weeks and showed normal range of motion at wrist and MP joints but reduced at PIP and DIP joints (Figure1). The tight muscles at these joints were stretchable, suggestive of dynamic contracture of intrinsic muscles along with residual capsular tightness. Paraffin (wax) bath was started along with passive mobilization of the PIP and

DIP joints, active range of motion exercises for wrist and MP joints and active usage of left hand in performing activities of daily living. After six weeks of inpatient, care she was discharged with no active psychopathology and full range of motion at all joints of left hand (Figure1). She was recommended a home-based exercise program and anti-psychotic medication.

Discussion

Frykman et al¹ described five patients with psychiatric illness (long-term depression, hypochondriasis, and/or schizophrenia) with contractures in hand. Since no organic basis could be identified in those patients, the authors coined the term “psycho-flexed hand” to describe that condition. Hand deformity in patients with psychiatric illness can be secondary to trauma, arthritis, congenital anomaly³, focal myotonia⁴, primary conversion disorder⁵, clenched fist syndrome⁶, psychogenic spastic hand⁷ or as a part of the active psychopathology¹. The most conspicuous primary neurological abnormalities in schizophrenic patients were motor coordination problems and involuntary movements⁸.

There were no features suggestive of congenital anomaly, arthritis or focal myotonia. Contractures of the hand are rather uncommon conversion phenomenon. She had a well-adjusted pre-morbid personality with no features of conversion disorder. “Clenched fist syndrome” is an entity in which the patient keeps one or both hands tightly clenched. It usually follows a minor inciting incident and is associated with swelling, pain, and paradoxical stiffness. No organic disease can be found and extension of the fingers is always possible under anesthesia. Psychiatrically the patient is classified as having severe anger and poor defense. The prognosis is poor⁶. The diagnosis of psychogenic spasm of the hand is a diagnosis of exclusion that requires a multidisciplinary team⁷.

In our case, the primary pathology in the development of the hand contracture (keeping the hand in fist position) was psychosis (an abnormal belief/delusion that she is holding her treasure in the closed hand and would lose that on opening the hand). The persistent fist position of the left hand leads to poor local hygiene and secondary infection which secondarily contributed in the development of the contracture.

Manipulation under anesthesia, corrective casting and splinting are established methods of managing

contractures in rehabilitation medicine like in rheumatoid arthritis and Alzheimer’s disease^{2,9,10}. The same principle can be utilized in managing secondary contractures of hand in patients with psychiatric diseases. Initially antibiotics and anti-inflammatory medications were given to reduce infection, pain and swelling. Following that corrective cast was applied to maintain the functional position of wrist and hand. Antipsychotic agents and ECT were given to control the primary pathology. Once she was amenable to therapy due to reduction in the symptomatology, cast was removed and passive therapy and paraffin bath were started to stretch the tight muscles. Measurement of wrist cock up splint was taken at that time of second cast application but due to significant reduction in the psychopathology and active participation in the management, eventually it was not required. Gradually, active therapy was started along with promotion of using left hand in performing activities of daily living.

Manipulation under anesthesia, corrective casting, splinting, exercises and positioning are established methods of managing contractures in rehabilitation medicine. When contractures of hands are identified in patients with psychiatric illness, same principles can be utilized to effectively treat it.

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In-Country WHO Fellowship in Comprehensive Rehabilitation in Spinal Cord Injury at Safdarjang Hospital, New Delhi

Dr Dipen Roy, MBBS, D. Ortho, Orthopedic Surgeon, TS District Hospital, Udaipur, Tripura (S)

I reached Delhi on 03rd June 2007 and was placed comfortably by the administration of Safdarjang Hospital, New Delhi.

On 04th June, I was introduced to the Medical Superintendent of Safdarjang Hospital and received a warm welcome in the Physical Medicine and Rehabilitation Department, I stayed until 30th June 2007..

In my experience, paraplegics and quadriplegics were leading a miserable life of various complications and neglect in the society. Dr. S. Y. Kothari and the whole team of the department showed me the rehabilitation of spinal cord injured patients to lead a useful and productive life.

A structured program for the four weeks duration was given to me under which I was given training in receiving these patients with detailed clinical, laboratory and radiological assessment. These patients are kept in the ward in an innovative way so that the small numbers of beds are utilized to the maximum limit. Treatment is divided in three phases so that the patients can practice this training in the inter-phase period, and come to know that this training is meant for their ultimate rehabilitation in their own milieu.

Skin (frequent change of posture), Bladder (self intermittent catheterization), and Bowel training and treatment is meticulously planned. General health is improved. Complications are treated. Upper limb strengthening and wheel chair ambulation training helps in mobility. Dr. R. Sharma and Dr. D. R. Tripathi are very active and innovative in patient management. Weekly Grand Round attended by full team of the department is a big learning experience, where all patients are thoroughly reviewed, progress assessed and further treatment planned.

Weekly seminars are a platform for theoretical inputs and discussions. All the seminars during my stay were around SCI rehabilitation and covered everything from basics, clinical work to physical, social and vocational rehabilitation. Dr. Sindhu, being young specialist, gives valuable theoretical inputs. Weekly operation theatre visit was a valuable experience in reconstructive and rehabilitation surgery. I could also attend various specialty clinics in the department where Dr. N. Laisram showed me rehab. management of many pediatric cases. Visit to various therapy sections and prosthetic and orthotic workshop was a big learning experience. Mrs. Poonam Dhanda is helping patients in social and vocational rehabilitation. Many patients have got help in getting bank loans for starting own business.

Empowered with this knowledge, I hope, I will be able to disseminate new ideas about rehab management among my colleagues and be able to create some facilities for similar patients, back home. I also plan to get enrolled for DNB in PMR, now that I have developed interest in the field.

I am thankful to the WHO, Safdarjang Hospital, New Delhi and Dr. S. Y. Kothari & Dr. R. K. Wadhwa for this opportunity to learn and my comfortable stay at Delhi. Now I am a proud Associate Member of IAPMR for lifetime.

Forwarded to the journal by

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Walking a Versatile Exercise

During a discussion on TV centred for the masses' general health and arthritis, a couple of times the anchor caught the PMR specialist saying why is it that he was emphasizing so much on the importance of walking for any ailment. The discussion took a different turn when the role of walking on the flexibility of joints, strength of muscles and bones, health of the digestive system, the cardiovascular system, the respiratory system, the urinary system, the reproductive system, the endocrine system and the general health of the mind in a healthy body was deduced. Some said it appears like some yogacharya lamenting on heightened claims on the whole body that by doing so you would 'cure' all. The PMR specialist clarified the doubts of significant contributions of walking exercise in different conditions affecting the human body. There is no doubt in the medical literature about the essentiality of appropriate exercise and activities like walking in a big chunk of medical conditions.

On the other hand, it is not uncommon for many doctors and others not exposed to PMR practices to advise rest and asking patients to avoid walking and many other activities even when walking may have a significant role in reversing the disability. If we just focus our attention on the osteoarthritis (OA) of the knee joints, by default the prescription from the PMR specialist would emphasize walking besides other activities, even if there is pain. Patients frequently retort back at the doctors and show their astonishment at the advice of walking since it induces or increases pain when patients are not used to doing it and many doctors have asked them not to. They may have many questions and excuses not because it may be painful if the condition was acute or the patient had not walked for a while, even months or years and walking aggravated pain. They have ready questions if walking induces pain then why walk, it is not the treatment, it is viewed rather as an aggravating factor. People like us have a hard time explaining the benefits of walking asking patients to ignore pain and rather fight it.

I am reminded of a very in-depth question by a patient, who was an executive, suffering from an advanced OA of both knee joints with moderate genu varum deformity. He was advised to have knee replacements and while waiting for it to have the analgesics and all other adjuvants and supplements that go commonly for such a condition. He asked two questions. First, what if analgesics are not taken. The answer was that it may only cause him some pain, depending on your bearing capacity. Second, would it cause any harm or would the condition deteriorate if analgesics were not taken. The answer was that it may not cause any harm bearing pain if he did not take analgesics unless he stopped the activities or walking etc. for fear of pain. He was explained that the dictum was to be able to perform bearing pain and if the pain stands between the performance of activities he should rather take the tablet than stop the activity. The above patient asked me this question when he was 60 years old, now at the last follow up he was 75 years and still going strong doing everything starting from his morning walks of 4

kilometers, though limping and with pain but it did not stop him from going around his social visits including taking care of his ailing wife bringing her to the hospital and infrequently coming up himself to have an another reinforcing opinion on his knees and only asking one more question: what if I don't get surgery done if I am going around like this. He was not scared of surgeries, only his choice. He had had a bad episode of an emergency abdominal surgery which prostrated him for about 6 weeks but he was back on his feet again in less than 3 months though, all I can say, it happened only because of his determination and understanding his illness and pain. Some patients find it easier to digest, where surgery is indicated but they don't get it done for their reasons or if there is a contra-indication to it for other reasons that people used to live like that when knee replacements were not in vogue or available.

We have come across a number of septagenarians taking to the bed for a couple of years come back to being active once again because of advanced osteoarthritic conditions adding on the inactivity, obesity, lack of will power and any reserve to bear pain only because of emphasis on promotion of walking. The important point in all such has been to optimize their walking and graduate it to a level which is acceptable rather than being extremely aggressive right in the beginning. It has also been studied and published in this journal based on the work done at AIIMS about the benefits of walking along with exercises. Exercises alone proved to be of benefit but with walking added it brought about greater benefits in patients suffering from OA knee. Walking alone proved to be better compared with exercises alone for patients in developing muscle strength measured on the dynamometer and also in relief of pain and participation in their activities. Patients perform exercise by walking better than just simple exercises. If we consider walking outside the house, prescribed as per the patients' tolerance level and then adding a little every week, it works wonders. Exercise in the form of walking is a better way to perform an exercise since patient may give up an exercise half way compared to walking where they cannot just stop anywhere and be carried back.

Another interesting case came up recently where fear of pain caused patient not to walk and how walking helped reverse a condition with serious implications. This time a 50 year old lady suffering from an old two level lumbar disc prolapse causing radicular pain for years and neurogenic claudication for the last one year. Claudication was hard to beat. Despite giving medication to reduce the neuropathic pain and tingling sensation, exercises to 'widen' the stenotic lumbar canal and belts, the claudication would not give way. She was advised therapeutic walking to walk at a slower pace in an effort to reduce the claudications, it helped at times but mostly did not reduce the deterioration of claudication time. It reduced from a level of 1 hour or 4 kilometers distance two years ago gradually down to 5 minutes of walking a

200 meters distance with increasing pain and disability with patient not able to tolerate pain or was afraid to walk further. Having waxing and waning at 5-10 minutes of neurogenic claudication level for over 6 months surgery was advised. Patient however came back from the surgeon and discussed the implications. At that level, perhaps afraid of surgery, patient felt like tolerating more pain and increase the walking level bearing pain little by little. Once determined to walk, the patient started venturing walking into pain ignoring the little pain that came up but did not stop increasing though walking slowly. The patient at the end of two and a half months lost 6 Kg from her 75 Kg total body weight reducing claudication and having a walk up to a distance of 3 kilometers in 1 hour 15 minutes with insignificant radicular pain bothering her at times. Having become lighter, able to do more activities and less pain, negligible claudication naturally averted surgery at least for a while, may be longer. It all happened apparently for two possible reasons: one, overcoming fear of pain and second walking did the trick in reducing weight and pain while every other intervention was just about the same when the patient was subjected to previously but to no avail.

Many a times I have a feeling that when dealing with patients with reduced functioning because of OA of spine or knees, deconditioning because of the milder heart or pulmonary conditions where patients for the fear of development of angina, tachycardia or dyspnea try not to venture walking. The only advice that does the trick is that in the beginning when patients not indulging in walking try to walk more than they do, they do have such symptoms. It is well known that these patients once they start to walk they start feeling better in a few days time. Only the initial few days are difficult. Patients with peripheral vascular disease, therapeutic walking opens up new collaterals as it happens in the coronary artery disease. Another area where sedentary patients with benign vertigo did not improve with medications or maneuvers, improved greatly after walking. A manager

in a media company who had vertigo for over three years had been on medications showed a long vertigo free period lasting years after he took to walking four to five kilometers on a daily basis. His weight reduced and the vertigo disappeared. The looks on the face showed the youth return in him. It not only relieved his vertigo, made him loose his weight, reduce the pain in the neck and also lowered his cholesterol, the known benefit of walking.

I don't think that counting on stories like that one can deduce that it is the only cure for all or one of the main cures for many. The point that I wish to make here is that this wonderful activity has not been taken so seriously by many medical practitioners. Besides, patients who do the household work or in the office say that they keep walking for hours while doing their jobs but they don't go out for walking for the sake of walking. At home or office it is hicks and starts or starts and stops. It is not continuous. When one does walk, the real benefits start after warm up when the aerobic activity starts. Hence walking longer helps. But for those who can't walk that much should not be dissuaded from walking saying it won't help since just having a single contraction for a couple of seconds also increases the strength by a fraction and makes the circulation better a bit. Why not take the benefit. Why say do this much. A little started can be augmented gradually, that is the key. It also makes the patient stick to doing activities well if the patient is asked to record his or her progress of walking in a chart form, review the chart on subsequent visits and then advise where the patients were having symptoms and how to trouble shoot them and what more they can do to improve, it gives a good feedback to the doctor and also makes the patient take it seriously. Works on the principles of biofeedback or to say the homework given to the children when they are likely to be defaulters.

Dr U Singh
Editor

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