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CONTENTS

Editorial Board

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Pricks

There has been a lot of gap between the demand and supply of PMR doctors, lately felt very acutely in India. Contrary to the times when a few who qualified found it difficult to find a place to work but now the positions are more than the people who qualify. Despite that it has been found that some still like to stick to the roots having no rewarding work at that place while some just keep waiting for the 'good' jobs to come up at a particular place. It has been believed by the seniors in the subject that if someone is not particular about choosing where to work, there are plenty of positions. One can rise on the ladder faster before many could not even dream of climbing halfway. Majority have been idling, some doing some different practices, a few even weird kind (excuse me for saying so) and some waiting for just the right job and the right opportunity to come by. The right opportunity is right now. We know that the specialty is now coming towards the bloom after the nascent stage. The time when the government is trying to fund medical colleges and hospitals to have the initiatives to start the departments of PMR, it is the force of doctors which is lacking all over the country. A few who could come and fill up the positions to be proud members of the fraternity and hold the pioneering positions in the not so glamorous places compared to the established ones are looking the other way, perhaps into the oblivion. What are we waiting for? The situation is like an egg and the hen. We have to produce hens without the eggs at present and we cannot wait for the hens to lay more eggs till the time hens are enough in numbers. Can't we at least initiate by being hens for a while at places where there have been no eggs to initiate laying eggs. Perhaps we have to be alone and fend for ourselves and have many set backs in a number of ways: academically, home front and emotional reserve wise. When man set out on the moon, the flight wasn't comfortable. The outcome was amazing and cherished by the whole mankind and perhaps it would remain to be in the times to come. The difficulties to be faced by the initiators of the novice departments would not be lesser. If man was to run away from the obstacles then so much progress would not have been made. When a PMR specialist inculcates the spirit of rehabilitation, the will to be alive and productive in his patients where is that spirit when it comes to self, trying to establish and restore the functioning of departments which are non-existent or impecunious, can't we revamp ourselves to face the challenges rather than taking the back seat letting things to happen. Can't we actively partake to hold the torch to lighten up the dark areas in the country where PMR is required and crying out loud for those who could be the beacons? I believe the time is right here. On one hand people thought the country is not prepared to take the initiative to start the departments and now on the other hand are we ready when the country on the whole is making efforts. We had quite a few pitfalls in the recent past. It went to the extent of being ashamed of ourselves making noises here and there to coax the authorities everywhere to show them the significance of PMR. Once convinced, we sit back and keep thinking someone would come but not us. Why not? The others down the lines waiting are hesitant to risk the efforts. One success would bring many come up. Why don't we pick up those areas in the country where there is nothing at present? The result of pains and sacrifices made in this direction would definitely be more gratifying than a great paper in an international conference or a revolutionary research outcome of a heavily funded project on the international scale. The patients benefited would be the reward, those making efforts in the government would feel fulfilled and we won't ask the questions of hens and eggs from each other. Each one of us has to think hard. Can't we make little sacrifices and be in the lesser glamorous world for a while doing things from the scratch rather than sitting on the well established solid chairs? We have to introspect and think hard what we are doing at present is the right step towards nation building doing our part of establishing and spreading the services of PMR in the country. Let's do our part with devotion and sacrifice. Let us not leave any opportunity to initiate a new area with PMR, let's not think of self for the moment. Let's say even thinking of self is also important, after all remuneration is not that bad in the government sector to maintain a reasonably good standard of living. The travel gurus say that while on a journey the destination is not of sole importance, the journey itself may have many thrills. Let's embark and explore the possibilities to find our destinations and mould them according to our needs and that of our nation. The deal may not turn out to be that bad in the end, eh! Help the Nation, Help the Specialty and Help Yourself!

Dr U Singh
Editor

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Adverse Effects of Low-Dose Methotrexate in Patients with Rheumatoid Arthritis

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Abstract

Methotrexate is widely used in the management of rheumatoid arthritis patients and is considered a first line drug. This study was conducted on 245 patients suffering from rheumatoid arthritis to study the adverse effects of low-dose methotrexate in adult patients of Kashmir valley fulfilling the revised American College of Rheumatology criteria. Adverse effects of the drug were seen in 96 (32.2%) patients but most of these were mild in nature. GI side effects were the most common adverse effects requiring treatment. Hepatic, haematological and muco-cutaneous effects were also seen. Considering the beneficial effects of the drug and the mild nature of the adverse effects, we recommend methotrexate in all patients of rheumatoid arthritis. Further, we also recommend regular use of folic acid in all patients on methotrexate and a follow-up of all patients to diagnose and manage any adverse effect of the drug.

Key words: Methotrexate, Rheumatoid Arthritis, Adverse effects, Low dose, Enzymes

Introduction

Rheumatoid arthritis is a chronic, progressive multisystemic inflammatory disorder with a prevalence of approximately 0.5-1%[1]. It usually involves middle aged adults with females being affected more than males. The inflammatory process of proliferating synovial membrane is immune mediated leading to destructive articular changes[2]. It is a chronic immuno-inflammatory disorder with symmetric polyarthritis involving small and large joints with repeated attacks of synovial inflammation causing articular cartilage damage with bone erosions.

In rheumatoid arthritis the potential for joint damage is present during the early phases of disease. Thus, the early introduction of effective treatment to maximally inhibit the inflammatory and destructive mechanisms has been recommended in recent times. Methotrexate is the preferred treatment for most of the patients of rheumatoid arthritis.

Methotrexate, synthesized in 1948, was developed primarily as an anti-tumor agent. Although first used to treat arthritis in 1951 by Gubner[3], the drug was not seriously considered as treatment for rheumatoid arthritis until late 1970s when Hoffmeister[4] reported improvement in patients of rheumatoid arthritis treated by intramuscular methotrexate. Methotrexate is a quick acting disease modifying agent and halts the progression of bony erosions, thereby preventing joint deformity and morbidity.

Methotrexate (N-10 methyl aminopterin) is a folate analogue and an ideal agent for rheumatoid arthritis. It is cheap and has a convenient weekly dosage [5,6,7,8,9]. It can be given orally, intramuscularly or by subcutaneous injection, with similar rates of absorption, regardless of the route of administration. Serum levels peak after 1-2 hours. Absorption is delayed by intestinal pathology such as inflammatory bowel disease, shortened bowel or malabsorption syndrome, but not by food. Methotrexate enters the cells where it is polyglutamated and the latter form may be responsible for the therapeutic effects of Methotrexate.

Toxicity is the main reason for discontinuation of the drug[10]. The most common side effects are those involving GIT (nausea, vomiting), hepatic, CNS (headache, dizziness), haematological and rarely respiratory. Most of these can be reduced by supplemented folic acid / folinic acid without interfering with the efficacy of the drug. Methotrexate is teratogenic and thus its use is contraindicated during pregnancy and lactation. Non-Hodgkin's (B-Cell) lymphoma which reversed with discontinuation of methotrexate has also been reported in patients with rheumatoid arthritis[11].

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Materials and Methods

Patients of either sex attending the OPD of the Department of Physical Medicine and Rehabilitation of Sher-e-Kashmir Institute of Medical Sciences, Srinagar were recruited prospectively from June 1997 till October 2004. The main aim of the study was to look for the toxicity of low dose methotrexate in patients of rheumatoid arthritis.

The patients of 18 years and above attending the Physical Medicine and Rehabilitation clinics that fulfilled the revised ACR criteria of rheumatoid arthritis were included. The patients included were both new cases as well as old cases with failure to continue other DMARDs for minimum period of 3 months due to non-effectiveness, non-availability or cost factors.

The following patients were excluded from the study:

(i) Insufficient kidney function (defined as estimated creatinine clearance of less than 7.5 ml/min).

(ii) Liver disease i.e., clinically significant hepatic impairment, liver enzymes more than twice the upper limit of normal values or dormant serious liver disease (e.g. cirrhosis).

(iii) Uncontrolled diabetes mellitus.

(iv) Severe congestive heart failure; interstitial lung disease; active peptic ulcer; inflammatory bowel disease; malignancies.

(v) Leucopenia (WBC count < 3.5 x 10^9/l); thrombocytopenia (platelet count < 120 x10^9/l).

(vi) Pregnancy; intended pregnancy; breast feeding or inability of adequate contraception[12].

After informed consent, all patients were started with methotrexate 7.5 mg per week given in an intermittent pulse regimen[6,7]. Folate supplementation in the form of folic acid tablets was given in all patients. Baseline investigations performed included haemogram, urine, KFT, LFT, Rh. Factor, CRP, ASO, ANA, X-ray chest and X-ray both hands-AP view[13,14]. Baseline liver biopsy was not done in any patient. In most of the admitted patients, intramuscular methotrexate was initially used for a period of 6-12weeks[15].

The patients were regularly followed up at 2 weeks, 6 wks, 3 months, 6 months and 6 monthly thereafter. At each follow up, a detailed history was elicited and physical examination done, especially with respect to methotrexate toxicity. Laboratory investigations including CBC with platelet count, LFT and KFT were done routinely. ALT and AST was determined every 4-8 weeks along with serum albumin. Special investigations like ultrasonography and pulmonary function tests were done depending upon the symptoms.

Observations

A total of 295 patients attending the Physical Medicine and Rehabilitation clinics between June 1997 and October 2004 were included in the study. Out of these, 27 patients were lost to follow up and hence excluded. 23 patients did not respond to the drug and were also excluded. Of the remaining 245 patients, 186 were female and 59 male with a male to female ratio of 1:3.2. The age of the patients ranged from 24 years to 65 years with the mean age of 43±4 years. Majority of the patients (127 patients) were in the age group 41-60 years.

Table 1: Age and sex distribution

Age (yrs)	*Males*	*Females*
21-30	2	12
31-40	14	34
41-50	31	84
51-60	8	43
>60	4	13
Total	59	186

The duration of the disease ranged from 4 months to 12 years with a mean duration of 6.8 years. Majority of patients (204) were already on NSAIDs, 31 patients on corticosteroids (mostly prednisolone) and 25 patients were on DMARDS other than methotrexate. 8 patients were on sulphasalazine and none of these had shown any improvement. 202 patients were positive for Rh factor and 43 were negative.

All patients were put on methotrexate. Of these, the drug was initially given by intramuscular route in 96 patients as they had NSAID induced GI symptoms. These patients were gradually transferred to oral route in 2-3 months. In the rest, oral drug was used from the beginning. 7.5 mg weekly was the initial dose which was gradually increased to a maximum of 20 mg/week depending on the response to the drug. The patients were gradually tapered off the NSAIDs. Corticosteroids were also gradually tapered off in the patients taking steroids. The average time for tapering off was 8 to 12 weeks – this being the time when methotrexate developed clinical response.

The patients were regularly followed up in the arthritis clinic. The minimum follow up was 6 months and maximum was 7 years. On each follow up, a detailed history, examination and investigations were done to assess the side effects and toxicity of drug. Out of the total 245 patients, 96 patients (39.2%) reported one or

the other adverse effect associated with the use of methotrexate.

Table 2: Side effects

Side effect	*No*	*%age*
GIT	51	21
Haematological	29	11.8
Hepatic		
Raised enzymes(< 2 times)	74	30
> 2 times	3	1.2
Skin	3	1.2
Mouth ulcer	5	2.0
Nodulosis	7	2.9
Respiratory	0	0

Gastrointestinal manifestations were the most common adverse effects of methotrexate use requiring treatment, seen in 51 patients (21%). These included a range of side effects like vomiting, diarrhea, nausea, and dyspepsia. Of these, nausea was most prevalent, occurring in 38 (15.5%) patients. Vomiting occurred in 13 patients 13(5.3%), dyspepsia in 19(7.7%) and diarrhea in 6(2.45%). Most of these responded to folate supplementation, H2 blockers and antacids. In 5 patients (2%) oral drug was replaced by intramuscular methotrexate for a period ranging from 4-6 wks. Temporary discontinuation of the drug was needed in nine patients, only to be restarted after 4-6 weeks at a lower dose. Two patients needed complete stoppage of the drug due to severe gastrointestinal side-effects and replacement by other DMARD'S.

Table 3: GIT manifestation

	Female	*Male*
Nausea	29	9
Vomiting	8	5
Diarrhea	4	2
Dyspepsia	13	6

Hematological side effects were seen in 29 patients (11.8%). The most frequent was mild to moderate leucopenia seen in 26 patients. Mild bone marrow depression (pancytopenia) was observed in two patients. This was a transient phenomenon and recovered following temporary withdrawal of drug for a period of 2-3 weeks. Megaloblastic anemia was seen in one patient. The patient likely had a baseline folate storage deficiency and improved with folate supplementation. Drug withdrawal was not needed in any patient. No case of severe bone marrow depression was seen.

Table 4: Hematological

	Female	*Male*
Leucopenia	21	5
Pancytopenia	2	0
Megaloblastic anemia	1	0
Thrombocytopenia	0	0

Hepatic abnormalities following prolonged Methotrexate use were also studied. 74 patients (30%) had elevation of liver enzymes. However, this elevation was mild in most of the patients. In 58 patients (78.3%) increase in liver enzymes was less than 15% above normal. Temporary withdrawal of the drug was required in four patients. Only in 3 patients enzymes increased more than twice the normal and in these cases the drug was discontinued to be replaced by other DMARDs.

Three patients (1.2%) developed recurrent skin rashes. The drug had to be discontinued in these patients. Oral ulcer was seen in five patients. Four patients had appearance similar to aphthous ulcer and one patient had vesicular lesion. Ulcers were single in all patients, except one, who had three ulcers. Two patients each had ulcers in floor of mouth and tongue and one patient had ulcer in buccal mucosa. Temporary discontinuation of the drug was required in these patients and they again started the drug after resolution of symptoms. No case of alopecia, hyperpigmentation and porphyria cutanea tarda was seen in the study.

Accelerated nodulosis was seen in six patients. The nodules were found mostly on the fingers and feet. Nodulosis was managed by decreasing the dose of methotrexate and addition of hydroxychloroquine. All the patients responded favourably. Mild elevation of serum creatinine was seen in 22 patients. However, the patients were clinically normal and the rest of investigations were normal. No case of gynaecomastia or erectile dysfunction was seen.

We did not come across any patient having respiratory system involvement in our study.

Discussion

Methotrexate as an anti-rheumatic agent came into prominence only in late 1970s. Since then, it has become the most widely used DMARD and an important drug in the armamentarium of rheumatologists. The main worry in the use of the drug was its toxicity, especially due to the fact that it is a known anti-neoplastic drug. However, the low dosage of the drug used in rheumatoid arthritis, coupled with a number of studies showing its low toxicity profile, have made it a popular drug now.

Our study was done to study the toxicity of low dose methotrexate in Rheumatoid arthritis patients attending

our out-patients' clinic. In this study 245 patients with a mean duration of disease of 6.8 years were evaluated and the adverse effects of the drug studied using clinical & laboratory parameters. Gastrointestinal side effects were the most prominent, occurring in 21% of the patients. These included anorexia, nausea, vomiting dyspepsia and diarrhea. Most of the studies have reported a similar percentage[16,17,18,19]. Bologna et al reported adverse effects involving GIT in 19.7% of cases. These effects are usually mild and managed with drugs (H2 blockers, antacids, folate supplementation). Haematological effects are also seen with long term Methotrexate use. In our study, 11.8% of patients had haematological side effects. Different studies have given different results, ranging from 4.5% (Bologna et al) to 25% (Gispan et al). These effects are generally mild leucopenia and mostly occur in elderly patients with diminished folate stores. Folate supplementation is sufficient for most of patients. Elevation of Mean Corpuscular Volume (MCV) usually precedes the occurrence of hematological toxicity[20]. Mild bone marrow suppression responds to temporary withdrawal of the drug for 2 weeks. Severe pancytopenia in a patient with renal insufficiency and hypoalbuminemia receiving salicylates and probenecid has been reported[21]. Pancytopenia most likely represents severe folate deficiency in a patient with baseline abnormal folate storage. Pancytopenia has also been seen after accidental methotrexate overdose in patients with hypoalbuminemia. Moderate to severe bone marrow suppression usually needs folinic acid.

Hepatic involvement with long-term methotrexate use is mostly mild increase in liver enzymes. We observed elevation of hepatic enzymes in 30% of patients which in most of cases was a mild increase not needing drug withdrawal. One case of clinically significant liver disease has been seen per 1000 patients treated for 5 years[22]. Predisposing factors include age of patient (or age at methotrexate initiation) & duration of treatment (or cumulative dose). Methotrexate probably induces liver toxicity by intracellular accumulation of methotrexate-polyglutamates. Routine liver biopsy is not recommended. Pulmonary involvement is a rare event with methotrexate treatment occurring in 0.5-1% patients (Beyder et al)[23]. However, Hilliquin did report pulmonary involvement in 12 patients with hypersensitivity pneumonitis (HSP) occurring in 4 patients and non-HSP lung disease in rest. The former occurred at 1-5 months of treatment. Most of their patients improved with symptomatic treatment. In our study, we did not observe any case of Methotrexate associated lung disease. New or accelerated nodulosis was first reported in 1986[24,25]. The prevalence ranges from 8-11% but we observed new or accelerated nodulosis in only 2.8% of cases. Methotrexate-induced nodulosis is more common in RF-negative patients. Adenosine-A1 receptors have been implicated in the development of the nodulosis.

Mucocutaneous involvement was seen in only 6 patients (2.4%) compared to 4.5% as seen by Carpenter et al[26]. The low incidence of stomatitis was probably low in our study as all patients received folic acid supplementation from the start of therapy with methotrexate. In the present study no case of hyperpigmentation, alopecia, porphyria cutanea tarda, gynaecomastia, interstitial pulmonary pneumonitis, osteopathy or teratogenesis was seen.

The overall incidence of adverse effects with the use of methotrexate in our study compare well those reported in most of the studies (Hilliquin et al, Beyeler et al, Besler et al, Buhroo et al)[27,28]. Most of the side effects were mild and usually responded to symptomatic treatment, folate supplementation and dose changes or temporary withdrawal. Only 8 patients had to stop the drug permanently. The low incidence of side effects can be attributed to regular evaluation of patients and the use of folic acid in all patients. The beneficial effects of folic acid have been reported by a number of authors. Folic acid has been noted to cause disappearance or decrease in adverse effects in 86% of patients[6].

Conclusions

Methotrexate is widely used for treatment of rheumatoid arthritis at early stage with minor side effects which are mostly reversed with folic acid/folinic acid. GIT, hematological and hepatic adverse effects are usually reversed with folic acid supplementation and other drugs.

In our study on 245 patients in different stages and of different age groups we found minimal side effects of the drug considering the duration for which the drug was used. Besides, most of the adverse effects responded to treatment. Hence, we recommend methotrexate to be considered in all cases of rheumatoid arthritis at any stage of disease so as to give maximum benefit to the patient. We also advocate routine supplementation with folic acid.

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A Low Cost Pulmonary Rehabilitation Programme for COPD Patients: Is it any Good?

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic morbidity and mortality worldwide. Dyspnoea and exercise intolerance are the two most common symptoms of COPD patients, making Pulmonary Rehabilitation essential in COPD management.

Objectives: To study the effect of a low-cost outdoor and home based pulmonary rehabilitation program on Dyspnoea indices and Exercise tolerance in uncomplicated COPD patients.

Design: Prospective Comparative analysis

Methods and Outcome Measures*:* COPD patients were included in a six-month rehabilitation programme - 32 patients who completed the programme formed the study group while those who opted out (17 patients) formed the control group. The American Thoracic Society Dyspnoea Scale, VAS scale and the 6 minute walking distance (6-MWD) were analysed in both groups, who continued on a similar drug management.

Results: The Dyspnoea indices showed significant reduction of over 64 % in the study group. The mean 6-MWD showed an average increase of 78.41 metres in the study group, while the control group showed an average decrease of 8.5 metres after six months, also statistically significant.

Conclusion*:* Even a low-cost outpatient and home-based comprehensive rehabilitation program shows substantial objective benefits.

Keywords: Pulmonary rehabilitation, Out-patient, COPD, Dyspnoea, exercise tolerance.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic morbidity and mortality throughout the world. Many people suffer from this disease for years, dying prematurely from it or its complications. COPD is currently the fourth leading cause of death in USA[1], Worldwide; COPD is the only leading cause of death that is increasing in prevalence. It is estimated that by the year 2020, COPD will be fifth amongst the conditions that will be the most burden to the society[1]. Every month, a new drug hits the market, with promises of 'relief' but falling short in really relieving the patient from the misery of the disease. It has been realized that drugs alone won't suffice if relief is desired. Over the past two decades there has been a gradual recognition of the benefits of pulmonary rehabilitation.

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Numerous studies have confirmed the benefits of pulmonary rehabilitation at various levels [2,3,4,5,6,7,8,20]. Majority of the studies used elaborate rehabilitation programs most of which had an indoor rehabilitation component. This caused a massive escalation of expenses, which added to the cost of medication beyond the reach of the majority of COPD population in the developing countries.

Dyspnoea and fatigue after mild exertion (decreased exercise tolerance) are the two most common and palpable symptoms experienced by patients with COPD [9,10].

Our present study tries addressing this problem. A home based trial on the outdoor patients was conducted to determine the impact of a low-cost pulmonary rehabilitation program in a group of COPD patients, compared with another group of COPD patients receiving only "routine" outpatient advice. Both groups continue receiving an optimal drug management.

Materials and Methods

An attempt was made to find the difference in Dyspnoea indices and Exercise tolerance in patients completing the programme was compared with a control group, which received no rehabilitation.

Centre: This study was conducted at the Department of Physical Medicine & Rehabilitation and the Department of Respiratory Medicine at the Institute of Post Graduate Medical Education and Research, S.S.K.M. hospital, Kolkata. The Study was done over a Period of 30 Months from October 2002 to April 2005.

Patient Selection: During this period 112 patients with Chronic Obstructive Pulmonary Disease, diagnosed in accordance to the GOLD guidelines[11] were randomly selected and screened for the study; 69 patients met entry criteria. All the patients were given the option of being included in the study, they were explained and educated about the rehabilitation programme, the cost and commitment involved and the need to follow up on time. 44 patients enrolled for the programme while 25 refused citing various reasons.

Most important reason for refusal in 19 pts (76%) was distance from home & inability to make frequent and timely visits, the rest had no specific reason.

Among the 44 patients recruited in the program 32 patients came for the 6 month follow-up on time, thus completing the programme, leaving a dropout of 12 patients.

Reasons for dropping out included inconvenience to attend the regular follow-ups for such a long duration (4 patients), concurrent illness (3 patients), personal problems (1 patient), no specific reason (2 patients). Among other 34 left, 2 died during the tenure of the programme, one after two weeks of starting the programme died from a severe exacerbation of COPD, the other died after six weeks following a road traffic accident. 32 patients went on to complete the programme, this comprised of 30 men and 2 women, with age groups ranging from 25 to 78 years. They formed the 'Rehab group'.

Of the 25 patients who opted out of the programme, 17 patients were available for follow up at the end of six months; other 8 could not be contacted. This group of 17 subjects was taken as the default control group or the 'Non-rehab group'.

Inclusion criteria

1. The diagnosis of patients suffering from mild to severe COPD was confirmed by history and physical examination, spirometry and chests x-rays in accordance to the GOLD guidelines. Patients with the diagnosis of chronic bronchitis and emphysema were accepted into the programme while patients with acute reversible airway diseases were excluded.
2. The patients were in a stable condition at the time of recruitment and were under the care of a primary care physician or a specialist receiving an acceptable medical regimen for their condition for over six months.
3. Expiratory airflow limitation was not reversible by bronchodilator inhalation (Reversibility was defined as an increase in FEV1 greater than 12% and/or 200 ml after inhalation of 200 µg of salbutamol).
4. Willingness to participate in all aspects of the study.

Exclusion criteria

Presence of any other significant disabling lung disease, serious heart problems, neurological complications or other medical condition e.g. severe lumbar spondylosis or gross osteoarthritis of the knee that could interfere with the patients' compliance with the programme.

Intervention: All patients were titrated to an optimal drug management, mostly all patients receiving inhaled Ipratropium bromide (40µg puff) thrice daily with salbutamol inhalation (100µg puff) on an as needed basis.

Group I were the Rehab group, they were inducted into the programme. The whole programme was conducted on an outpatient basis training followed by home exercise programme.

It comprised of 4 major components*:*

1. Education
2. Exercise training
3. Psychosocial/behavioural intervention
4. Outcome assessment

Education: On the day of induction the patients were educated on pre decided topics about various aspects of the disease, its prognosis and its management. The patients were also briefed about the drugs they were prescribed, their utility and side effects, smoking cessation techniques and importance of having a good compliance. The patients were then explained about the components of the rehabilitation programme. The advice on nutrition and the required supplementation was given at this stage.

The patients were asked to return for 2 days for a supervised training for approximately 60-90 min/day. A senior physiotherapist aided with visuals of exercise manoeuvres gave the exercise training. All patients were given the same programme, with the intensity guided by the patient's Target Heart Rate (THR). The target heart rate was determined using the Karvonen's formula [12]

THR= heart rate before 6min walk + 50% -70 % x (heart rate after walk - heart rate before walk).

The patients were taught monitoring their own heart rate during the exercise training and were advised not to exert beyond the target heart rate or if they felt breathless.

The exercise program (Table I) comprised of three components:

a) Postural relief techniques

b) Chest specific manoeuvres

c) General reconditioning exercises

Exercise prescription

Frequency : 5 times per wk

Intensity : 50%-80% of THR along with moderate perceived dyspnoea

Timing : 30 min aerobics (walking and stair climbing exercise) 10-15 min strength training with home available weights up to 5 kgs (arm raises, supported bench presses, mini squats and incremental spirometry).

TABLE I: The Pulmonary Rehabilitation Program

1.	Education	Disease Pathophysiology & prognosis, exercise conditioning, energy conservation, Nutrition & Smoking cessation advice and Importance of compliance to the programme etc. Supervised training for two days (1 hr sessions) to be followed at home. a) Postural relief techniques - 20° forward lean with support b) Chest specific maneuvers i. Controlled Breathing Techniques - Purse Lip & Diaphragmatic breathing (2-5 min BD) ii Postural drainage & huffing - 10-15min OD
2.	Exercise Training	c) General reconditioning Exercises Arm raises -front, lateral, back with 1-5 kgs - (2 x10 reps) Supported pushups (2 x 10 reps) Slow stair climbing ex (2min) Mini Squats (2 X 10 reps) Brisk Walking (5 – 30 mins) Incentive spirometry at low intensity (2-5 mins)
3.	Psychosocial / Behavioral Intervention	Advice and reinforcements to maintain a non-smoker status, screening for Depression etc.
4.	Outcome Assessment	Dyspnoea Indices (ATS shortness of breath scale, perceived dyspnoea by VAS), Exercise tolerance by 6MWD.

TABLE II: American Thoracic Society (ATS) shortness of breath scale. [13]

0	**None**	Not troubled by Shortness of Breath (SOB) when hurrying on the level ground or walking up a slight hill.
1	**Mild** **Moderate**	Troubled by SOB when doing so. Walks up more slowly than people of same age on level ground because of breathlessness or has to stop for breath when walking at own pace at level ground.
3	**Severe**	Walks up more slowly than people of some age on the level because of breathlessness or has to stop for breath when walking at own pace at level round.
4	**Very Severe**	Too breathless to leave house, breathlessness on dressing / undressing.

The patients were also given an illustrated handout of the exercise program. The patients were asked to start the exercises with minimum repetitions gradually increasing it to the recommended level according to their tolerance.

Psychosocial/behaioural intervention

At each follow-up, the patient and their family members were addressed and encouraged to speak about the difficulties they faced in coping up with their day-to-day life. Efforts were made to determine if the patient was at any point showing any features of depression, anxiety, fear, or was having any family or social problems. The primary behavioural intervention that was done was to help the patient to quit smoking completely.

Outcome assessment

All the patients were asked to follow-up after 3 months and finally after 6 months. Measures of outcome were grouped into two categories:

1. Dyspnoea indices (on American Thoracic Society scale for shortness of breath and Visual Analogue Scale) were assessed.
2. Exercise tolerance by the 6 Minute Walking Distance

Dyspnoea Indices - The shortness of breath is a scale issued by the American Thoracic Society (ATS) [13] is shown in Table II. The grading is made considering patient's condition in the last 24 hours. This grading is a modification of the Medical Research Council (MRC) dyspnoea scale. The ATS dyspnoea measured was developed for epidemiological studies and has similar indications to the MRC.

The second dyspnoea index was the perceived dyspnoea index measured using a Visual Analogue Scale (VAS). This was administered to the patients after the 6 min Walking Distance (6MWD). The VAS [14] is usually a 100 mm line anchored at either end with descriptors, such as "none" to "very severe." When used to measure dyspnoea, these anchors are qualified to read "no shortness of breath" to "maximum shortness of breath". The patient was asked to mark his perceptible dyspnoea level on the line; this value was measured and noted. The validity and the reliability of this test is firmly established [15,16.]

Exercise tolerance - this was determined by the 6MWD[17]. To measure the 6 MWD, the patient was asked to walk; covering as much distance as possible during six minutes, along a calibrated 20m long path, walking to and fro, and the total distance covered at the end of 6 minutes was recorded. During the duration of the walk, the patient was allowed to stop for a breather if he or she felt it necessary. On the first day, a practice walk was scheduled, while the testing was done the next day.

The Non- Rehab group – received no rehabilitation intervention, they continued with their optimal drug regimen. Along with that they were also given the 'routine' OPD advice regarding the importance of quitting smoking and other precautions and instructions (except exercises and walking) that are given in the out patient setup. This group of patient was called back (by phone or by post) at the end of three months and finally after six months to assess the Dyspnoea indices and administer the 6MWD test. These patients were instructed about the procedure before taking the test.

The outcome assessment was carried out by a physician who was not involved in the management of the patients, and he was not informed about which Group the patient belonged to. This was done to eliminate any sort of assessment bias.

Statistical evaluation: the mean values of the Dyspnoea indices (ATS and VAS) and the mean change in the 6MWD after six months were used as a primary outcome measures for this trial. The calculations were done separately for the rehab and the non-rehab group. Descriptive statistics were carried out for both the groups to check how well both the group's matched.

The Age and sex distribution, socio-economic group and education levels were compared using relevant statistical tests. Both groups were found to be well matched.

The base line and end study parameters were compared using the appropriate nonparametric tests.

Mann-Whitney U test was used to compare between the Rehab and Non-Rehab groups as non parametric values were being compared, while Wilcoxon's matched pairs of Signed Rank test was used to compare the values within the Group. The statistical evaluation was done using STATISTICA (version 6) statistical software.

Results

A total of 49 subjects were involved in the study with 32 patients forming the Rehab group (study group) while 17 patients were included in the Non-rehab group (control group).

The average age of the patient groups were-

Rehab Group = 50.13 ± 3.86 years

Non-rehab Group = 49.12± 6.77 years

The mean base line values were thus-

	Rehab Gp	**Non-rehab Gp**	p value
ATS (SOB) grading	2.28	2.24	0.793
VAS -perceived dyspnoea	45.3mm	46.8mm	0.614
6MWD-	330.72m	321.53m	0.689

The baseline parameters between the two groups were

compared using the Mann-Whitney U test. There was no significant difference found between the values of the two groups.

The mean End Study values were -

	Group I	Group II	p value
ATS (SOB) grading	0.72	1.88	<.0001
VAS -perceived dyspnoea	16mm	46.2mm	<.0001
6MWD-	409.13m	313.0m	<.0001

The end study parameters showed a significant difference between the Rehab and Non-Rehab groups when compared using the Mann-Whitney U test. Comparing the baseline and the end study values within the group showed decrease in dyspnoea indices in both the groups. In the rehab group (Group I) the ATS grade was reduced by 1.56 (68.42% reduction), which was statistically significant, while the same in the non-rehab group was 0.36 (16.07% reduction), which was not significant (Fig I). The perceived dyspnoea index measured by VAS showed a significant 29.3 mm (64.68%) reduction in the rehab group while the reduction was 0.6 mm (1.28%) in the non-rehab group (Fig II), which was not found to be significant. The change in the 6 minute walking distance (6MWD) was most significant (Fig III). In the rehab groups there was a mean increase of 78.41 m (23.71%) among the subjects. This difference was highly significant statistically. While in the non-rehab group the mean 6 MWD showed a decrease by 8.53m (2.65%) at the end of six months (Table III).

Discussion

In patients with COPD, dyspnoea and a reduced capacity for work are two of the most disabling symptoms experienced [9,10]. Findings in this study indicate definite benefits of an outdoor and home-based comprehensive pulmonary rehabilitation program in patients with COPD as compared with patients who received only 'routine' outpatient advice.

We found that the patients in the Rehab group showed significant improvements in dyspnoea indices. At the end of the study these patients felt less 'breathless' and were able to tolerate higher levels of exertion. The improvements noted in the dyspnoea levels and exercise tolerance concurred with most previous findings.

Goldstein[3] showed significant benefits in dyspnoea levels of 45 patients who participated in an 8-week inpatient pulmonary rehabilitation program followed by 16 weeks of supervised outpatient care.

Reardon[5] in a controlled study of an outpatient pulmonary rehabilitation program showed a 2.3 unit increase in the Transitional Dyspnoea Index (TDI), indicating significantly reduced dyspnoea levels, along with reduction of exertional dyspnoea measured by VAS.

In one of the largest studies on pulmonary rehabilitation Ries[2] concluded that patient's receiving comprehensive pulmonary rehabilitation showed significantly improved exercise endurance and reported less dyspnoea and greater comfort when walking as compared to patients who received education alone.

Exercise tolerance was measured using the 6-minute walking distance (6MWD). In our study we noted an increase of 78.41m (23.71%) in the 6MWD after six months. Redelmeir[17] suggested that the minimal clinically meaningful increase in the 6MWD is about 54 m. We anticipated some improvements in the 6MWD as the patients were on an exercise regimen targeted to counter the deconditioning effects of COPD. It is also worth noting that the non-rehab group actually showed a decrease of 8.53 m at the end of the six-month study. The value, though non-significant, is suggestive of a reduction in exercise tolerance

Our findings correlated with most trials of pulmonary

TABLE III: Comparison between various parameters of the two groups

Rehab Group

	Baseline	End study	Diff	% age	p-value
ATS gr	2.28	0.72	-1.56	68.42	<0.001
VAS	45.3 mm	16 mm	-29.3 mm	64.68	<0.001
6MWD	330.72m	409.13m	78.41m	23.71	<0.001

Non-Rehab Group

	Baseline	End study	Diff	% age	p-value
ATS gr	2.24	1.88	-0.36	16.07	0.156
VAS	46.8 mm	46.2 mm	-0.6	1.28	0.568
6MWD	321.53m	313.0m	-8.53m	2.65	0.453

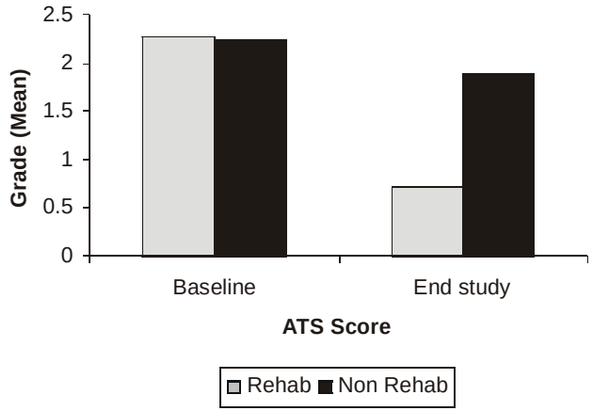

Fig- 1. Comparison of Dyspnoea index using ATS shortness of breath scale between the Rehab and Non Rehab Group at Baseline and after 6 months.

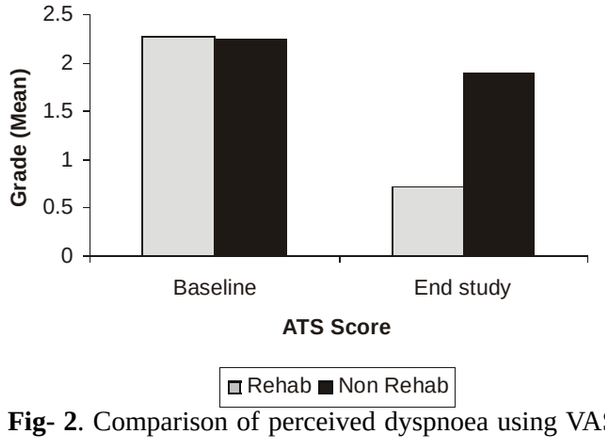

Fig- 2. Comparison of perceived dyspnoea using VAS scale between the Rehab and Non Rehab Group at Baseline and after 6 months.

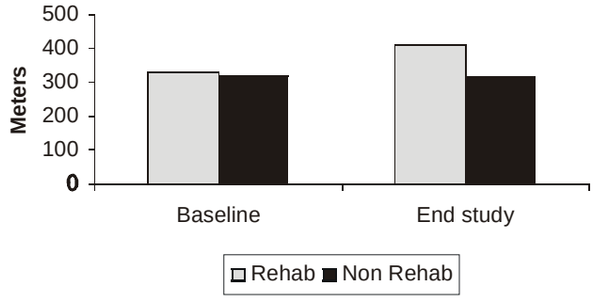

Fig- 3. Comparison of exercise tolerance using 6 MWD between the Rehab and Non Rehab Group at Baseline and after 6 months.

rehabilitation as shown by a meta-analysis done by Casaburi[18] who reviewed 36 uncontrolled studies that evaluated the effect of exercise training on exercise performance in over 900 patients with COPD. It was noted that training improved exercise tolerance in all these patients. This finding is supported by numerous controlled and uncontrolled trials showing the rehabilitation program with lower extremity exercise is better than other forms of therapy, such as optimisation of medication, education, breathing retraining, and group therapy[2,3,4,5]. These results of short-term rehabilitation parallel other studies. In severe chronic obstructive pulmonary disease, the 6-min walk distance predicts mortality better than other traditional markers of disease severity. Its measurement is useful in the comprehensive evaluation of patients with severe disease[19]. Bendtrup[20] in a controlled 12-wk study of outpatient pulmonary rehabilitation, the 6-min walk distance increased by 80 m at 6 wk (halfway in the program), 113 m at the end of the program, and 96 m 12 wk after the program ended. These changes were all significantly greater than those of the control group.

In essence, our findings concurred with most of the international findings, showing improvements of dyspnoea levels and exercise tolerance with pulmonary rehabilitation. But the most striking thing was that the rehabilitation programme used was a compact, outpatient and home-based program using less time in the hospital, minimal resources but producing significant benefits comparable to similar studies. These findings support the prescription of similar rehabilitation program to all patients with COPD.

Conclusion

Even a low-cost outpatient and home-based comprehensive rehabilitation program showed substantial benefit in objective measures of dyspnoea and exercise tolerance. It should be considered as a mandatory component of COPD management and future research should be targeted on the effects of more streamlined low-cost programme, on various parameters and concerns of patients with COPD.

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CT Scan as a Tool for Predicting Outcome of Stroke due to Intracerebral Haemorrhage at a Referral Hospital

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Abstract

Objective: To find out the correlation of computerised tomography (CT) findings with clinical outcome of intracerebral haemorrhage (ICH) in the regional population of Manipur.

Methods: One hundred consecutive CT scan proven stroke patients following ICH admitted in the departments of Medicine and Physical Medicine and Rehabilitation, Regional Institute of Medical Sciences, Imphal during January 2004 to December 2004 were studied. Site, size and volume of haematoma, pineal gland displacement and intraventricular extensions of ICH were correlated with the clinical outcome using a modified Rankin 1-5 scores on the 30th day of stroke onset. Associated risk factors like hypertension, smoking, diabetes and alcoholism were also recorded.

Results: Seventy eight percent of patients belonged to the age group between 41 to 70 years. Hypertension was the most common (78%) risk factor followed by chronic smoking (24%), chronic alcohol abuse (22%) and diabetes mellitus (8%).The sites of ICH in order of frequency were putamen (65%), lobar (17%), thalamus (13%), pons (3%) and cerebellum (2%) respectively. Out of them, 49% had ICH on the left side, 48% on the right side and 3% had bilateral lesion. The volume of ICH was within the range of 4 to 196 ml with a mean volume of 46.6 (+ 32.1) ml. Outcome was better (Rankin 1 – 3) in lobar ICH (47%) than in thalamic and putaminal / lentiform ICH (30.7% and 27.7% respectively). Maximum number of deaths occurred in the first 3 days which comprised 58.1% of all deaths. The mean volume of ICH among the deaths was significantly higher than the surviving group (65.60 + 36.6 ml vs 32.30 + 18.3ml). Mortality was as high as 90.9% when the volume of ICH was more than 80 ml. Mortality was significantly higher among patients of ICH with pineal gland displacement of more than 3 mm and intraventricular extension.

Conclusion: The present study showed that death and functional status on the 30th day of stroke onset were well correlated with the initial ICH volume which could be regarded as a good indicator for each location.

KEY WORDS: Stroke, Intracerebral haemorrhage, CT scan, Modified Rankin Score

INTRODUCTION

Intracerebral haemorrhage (ICH) is referred to as bleeding in the brain parenchyma itself[1]. It is the most common type of non traumatic intracranial haemorrhage and an important cause of stroke, especially in Asians and Blacks[2]. It accounts for 10 to 15 percent of all strokes in Whites and about 30 percent in Blacks and individuals of Asian origin. It is a major cause of morbidity and mortality of stroke[1].

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Numerous epidemiological studies have found that incidence of ICH increases with advancing age and vary with geographical location and races. In addition to advancing age, hypertension and ethnicity, a number of other risk factors have been recently evaluated which include cigarette smoking, alcohol consumption and serum cholesterol levels[3].

An intracerebral haematoma on CT appears as a homogenous well defined area of hyper attenuation which may be surrounded by a zone of low attenuation attributable to oedema, ischaemia or clot retraction[4]. At some stage, as early as 2 weeks, the haematoma becomes

isodense with the surrounding brain and later may leave a smaller area of low attenuation. It is found that the smaller the haematoma, the more likely it was to resolve completely[5].

Numerous workers found in CT that large haematoma volume, mid line shift or pineal gland displacement, intracerebral haemorrhage rupturing into the ventricular system and varying shapes of lesion in different sectional views are the factors that predict mortality[6,7].

So far there is no study to correlate between CT scan findings and outcome of ICH in the regional population of Manipur. Hence, the present study was contemplated to find out the relationship between CT scan findings and outcome of ICH.

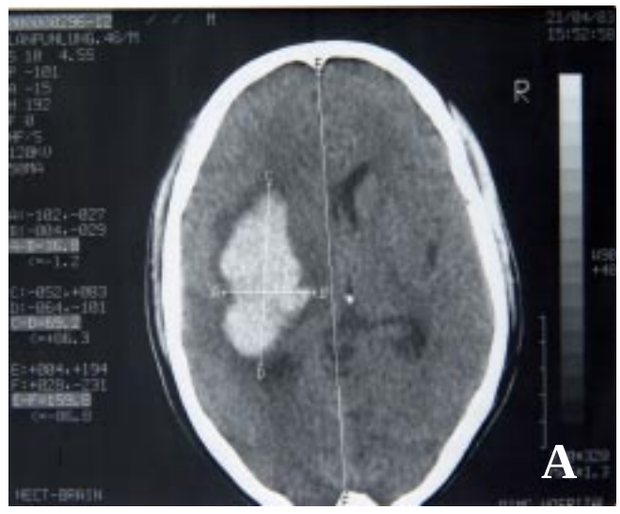
Materials and Methods

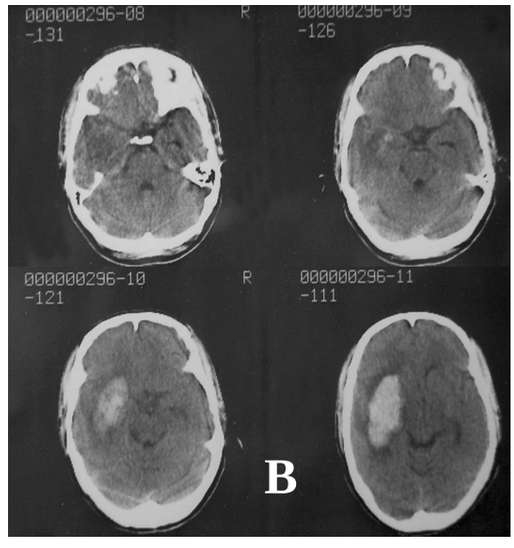
The study was conducted on 100 consecutive cases of intracerebral haemorrhage consisting of 72 males and 28 females who were admitted in the departments of Medicine and Physical Medicine and Rehabilitation of the Regional Institute of Medical Sciences, Imphal during January 2004 to December 2004. Cases that fulfilled the WHO criteria for stroke i.e., rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin. CT scan were carried out in the Department of Radiodiagnosis in the institute within 7 days of the onset of stroke were included in the present study. Patients with haemorrhage secondary to trauma, brain tumour, CNS infections, recurrent stroke, predominant sub-arachnoid haemorrhage and patients receiving anticoagulant therapy were excluded from the study. A standard treatment protocol was followed for all patients under study.

Clinical Examination: A general physical examination was done. Blood pressure and pulse rate were duly recorded on admission. Then, following the guideline of the study proforma, complete neurological system examination was carried out. Careful examination of other systems were also undertaken to uncover any other systemic affection.

The following baseline parameters were recorded in relation with the study: age, sex, vascular risk factors, hypertension (> 140/90 mmHg), diabetes mellitus (preprandial blood glucose level > 140 mg/dL and postprandial level > 200 mg /dL), haemorrhage side (left or right or both), haemorrhage location, haemorrhage size and volume, pineal gland displacement on CT scan, intraventricular spread of the haemorrhage, initial level of consciousness (normal, drowsy or comatose), limb paresis, oral comprehension and expression.

The epicenter of each haemorrhage was used to name the locus of the lesion. The ICH was classified according to the location of the largest blood clot as follows: lobar





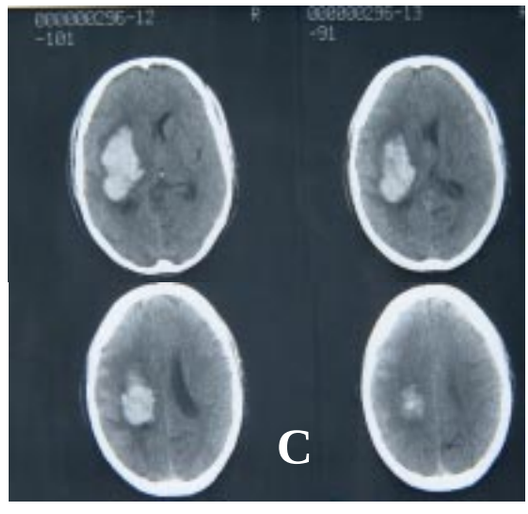


Figure 1: A. Left Putaminal Intracerebral Haemorrhage (ICH) volume measured 0.523 (36.8 x 69.2 x 60) mm³ equivalent to 79.9 ml. Largest axial ICH dimension of 36.8 mm x 69.2 mm; (B&C) Caudocranial dimension of the ICH equal to 60 mm.

(frontal, rolandic, parietal, temporal, junctional, occipital), deep (putaminal, thalamic, caudate), posterior fossa (medullary, pontine, midbrain, cerebellar) or intraventricular. Hypodensity surrounding the haematoma, the presence and extent of intraventricular bleeding and mass effect were also recorded.

The haematoma size was measured by its greatest diameter. The size of the intracerebral haemorrhage on a CT scan was estimated by measuring the longest axis of the region of increased attenuation and its greatest width at 90º to this axis.

The haematoma volume was evaluated on the CT films by simple formula of an ellipsoid volume = ¾π abc, where a, b and c were the radii of the three spatial dimensions measured in the greatest lesion seen from axial CT scan and counting slices of lesion as described by Broderick et al[8]. Calculated volume was equal to 0.523 X (L x B x H) where L, B and H were the three spatial dimensions of ICH.

Patient outcome was evaluated at 30 days post stroke onset as either death or alive scored in modified Rankin score from 1 to 5 (1 = no significant disability, 2 = slight disability – unable to carry out previous activities, but able to look after oneself without assistance , 3 = moderate disability requiring some help but able to walk without assistance , 4 = moderate-severe disability – unable to walk without assistance, 5 = severe disability-bed ridden, incontinent, requiring constant nursing care and attention) as described by Tatu L et al[9].

Result

The age of the subjects ranged from 25 to 85 years with a mean age of 58.6(+ 12) years. Male-female ratio was 2.6:1. Majority of the cases belonged to the age group of 51 to 60 years (31%). The number of cases between 41 to 70 years represented 78% of all cases. The mean time from stroke onset to CT scanning ranged from 4 hours to 94 hours with a mean value of 28.4 (+19.43) hours.

Hypertension was the most common (78%) risk factor. Other risk factors were chronic smoking (24) and chronic alcohol abuse (22), diabetes mellitus (8).

The sites of ICH in order of frequency were putamen (65%), lobar (17%), thalamus (13%), pons (3%) and cerebellum (2%) respectively. Forty nine patients had lesions on the left side, 48 had ICH on the right side and 3 had bilateral lesion.

The volume of ICH was within the range of 4 to 196 ml with a mean volume of 46.6 (+ 32.1) ml. The interquartile range was between 22.1 ml to 63.0 ml with a median of 41.2 ml.

Pineal gland displacement less than 3 mm was seen in 59% of cases and 3 mm or more in 41 (41%). Intra-ventricular extensions of ICH were present in 31% of the cases.

Table-I. Relationship between location, volume of ICH and Outcome

Location	Cases	Patient's outcome in No. with mean hemorrhage volume (ml)		
		Alive		Death
		Rankin 1-3	Rankin 4&5	
Putamen/ Lentiform	65	18 (16)	17 (44)	30 (76)
Thalamus	13	4 (13)	2 (33)	7 (45)
Lobar	17	8 (30)	6 (57)	3 (67)
Pons	3	0	0	3
Cerebellum	2	1	1	0
Total	**100**	**31**	**26**	**43**

Table 1 showed overall case mortality rate of 43% of all ICH patients within the first month. Among the survivors, 26% associated with poor outcome (Rankin 4 and 5) and 31% with good outcome (Rankin 1 – 3). Among the three locations of ICH, thalamic haemorrhage was commonest (53.8%), followed by putaminal (46.2%) and lobar haemorrhages (17.6%). Outcome was better (Rankin 1 – 3) in lobar ICH (47%) than in thalamic and putaminal/ lentiform ICH (respectively 30.7% and 27.7%). Maximum number of deaths occured in the first 3 days which comprised 58.1% of all deaths.

Table – II : Mean ICH volume and outcome

Patient outcome (Status)	No. of cases	Mean volume + SD (ml)
Rankin 1 - 3	31	21.30 + 12.6*
Rankin 4 & 5	26	45.43 + 15.0*
Death	43	65.60 + 36.6*
Alive	57	32.30 + 18.3ϕ
Death	43	65.60 + 36.6ϕ

*p-value <0.001 ϕp-value<0.001

Table II showed that the mean volume of ICH among the deaths was significantly higher than the surviving group (65.60 + 36.6 ml vs 32.30 + 18.3 ml). Moreover Rankin score within the first one month was found significantly correlated with mean ICH volumes.

Table- III : Mortality by volume of ICH

Volume (ml)	No. of cases	Patient's outcome, n (%)	
		Alive	Death
< 40	48	40 (83.3)	8 (16.7)
41 – 60	25	13(52.0)	12 (48.0)
61 – 80	16	3 (18.8)	13 (81.3)
> 80	11	1 (9.1)	10 (90.9)

p < 0.001

Table III showed a statistically significant association ($p < 0.001$) between mortality and increasing volume of ICH. Mortality was as high as 90.9% when the volume of ICH was more than 80 ml.

Table IV : Mortality by pineal gland displacement and intraventricular extension in ICH

Findings	No. of cases	Patient outcome	
Pineal gl. displacement		Alive	Death
< 3 mm	59	45 (76.3)	14 (23.7)*
> 3 mm	41	12 (29.3)	29 (70.7)*
Intra-ventricular Extension			
Present	31	8 (25.8)	23 (74.2)ϕ
Absent	69	49 (71.0)	20 (29.0)ϕ

*p<0.001 ϕp<0.001

Mortality was also found to be influenced by pineal gland displacement and intraventricular extension of ICH (Table IV). Mortality was significantly higher among patients of ICH with pineal gland displacement of more than 3 mm and intraventricular extension.

Discussion

Stroke due to intracerebral haemorrhage seems to be increasing in Manipur over the last few years. It is not possible to differentiate reliably between intracranial haemorrhage and infarction on the basis of clinical features alone[10]. For diagnosing and differentiating the type of stroke as early as possible, computed tomography (CT) scanning of the brain is the gold standard investigative procedure and in practice most stroke patients should ideally have a CT scan done[11].

In the present study CT scan confirmation of ICH was done within 4 (four) days of the clinical onset with the mean time of 28.46 hours of onset which is comparable to the study by Tatu et al[9]. Dennis[12] also highlighted that CT scan should be performed ideally within 7 (seven) days after stroke onset.

Present study showed that majority of the subjects belonged to the age group of 41 to 70 years comprising 78% with a mean age of 58.6 years, which is comparable to the studies by McKissock et al[13] and Weisberg[14]and Fieschi et al[15]. Male predominance over female (2.6:1) was also observed by Nilsson et al[16].

Hypertension was found to be the commonest risk factor (78% of the cases) in the present study. Similar observation was reported by Weisberg[13] in 81%, by Douglas et al[17] (1982) in 80% and 75% of ICH by Scott et al[18]. Cigarette smoking was associated with ICH in 24% of cases. Comparable observations were made by Shinton and Beevers[19] in 27%, and by Tatu et al[9] in 18% of ICH cases. Regular alcohol consumption was noted among 22% of the subjects. Tatu et al[9] also reported alcoholism in 18% of cases. Diabetes was found in 6% of cases against 10% reported by Nilsson et al[16].

The sites of lesion in intracerebral haemorrhage determined by CT scan in order of frequency in the present study were (i) putamen/lentiform nucleus of basal ganglia (65%) (ii) lobar (17%) (iii) thalamus (13%) (iv) pons (3%) and (v) cerebellum (2%). Feldmann[20] reported the sites of involvement by ICH in order of putamen (35%), lobar (30%), cerebellum (15%), thalamus (10%) and pons (5%). Tatu et al[9] found ICH to be the most prevalent in lobar (36.5%), followed by lentiform area (32%), thalamic (15.7%), cerebellar (8.8%), midbrain and pons (2%), intraventricular haemorrhage (92%), caudate (1%) and multiple (2%). Scott et al[18] in their study found that putaminal bleeding (35%) was the commonest followed by lobar (30%), thalamus (10%), cerebellum (15%), pons (5%) and caudate (5%). The finding in the present study is comparable with Scott et al[18] except for cerebellum which is the least common site in the present study. These differences in frequency of ICH locations could be due to difference in geographical and genetic factors.

The mean volume of ICH in this study was 46.6 ml for all patients and among the deaths mean volume was 65.6 ml. Tatu et al[9] found the mean volume of 34.1 ml for all the patients and 76.2 ml among the worst outcome comprising death in 92%. These differences in the mean volume of haematoma could be due to various associated risk factors among different population and the nature of patient recruitment. Lampel[21] quoted that critical lethal outcome were associated with 50 ml[22] or 80 ml[23] in lobar haemorrhage. Kase[24]found lobar ICH with volume larger than 50 ml who were comatose on admission have mortality close to 100%. Similar pattern of higher mortality among the patients having larger haematoma volume was also noted in the present study with statistical significant findings of 85.2% and 90.9% mortality among the ICH volume greater than 60 ml and 80 ml respectively. Mukherjee and Hazra[7] observed 67.3% mortality among ICH volume greater than 40 ml.

The over all mortality rate of 52% at 30 days was reported by John Bamford[25] with 56% of the death occurring in the first 3 days of onset. In other studies, 30 days ICH mortality rate were found to be 30% by Fieschi[15]and 35% by Anderson[26]. Tatu et al[9] reported over all mortality of 24.2% at 30 days and death in the first 3 days constituted 48% of all deaths. In the present study over all 30 days mortality rate was found to be 43% with first 3 days mortality of 58% of total death which could be comparable to above studies. Similar 30 days mortality rate was found in the study by Frank[27]. However, Silver[28] reported 80%

mortality within 72 hours in their study. These differences in the mortality may be due to variations in population, risk factors and facilities availability.

Anderson[26] reported 28 days case fatality rate among the ICH locations as 100% in brain stem, 30% in cerebellum, 22% in basal ganglia and thalamus, and 21% in lobar haemorrhage. Similar pattern of case fatality were also observed in the present study other than cerebellar ICH.

Wiggins et al[29] reported that ICH with hypertension in 62% of cases and mid line shift or pineal gland displacement > 3mm showed mortality rate of 40%. In the present study, ICH with hypertension in 80% of a cases and pineal gland displacement > 3 mm shows (70%) mortality rate. These differences may be due to difference in risk factor incidence such as hypertension.

Intracerebral haemorrhage with intraventricular extension influenced the mortality rate of 65%, 67% and 70% as observed by Wiggins et al[29], Weisberg[13] and Fieschi[14] respectively. In the present study ICH with intraventricular extension influenced the mortality rate of 74% than without intraventricular extension of 29% mortality which is comparable with the above studies.

Tatu et al[9] found that outcome was closely associated with initial haematoma volume. In their report, Rankin 1 – 3 was associated with a mean volume of 13.1 ml, Rankin 4 - 5 with 32.9 ml and death with 78.8 ml in 95% of cases. Present study showed Rankin score 1 – 3 with initial mean ICH volume of 21.3 ml, Rankin 4 and 5 with 45.4 ml and death with 80.0 ml in 90.9%. However due to variations in evaluation scales used by various authors, it is difficult to compare the functional status of survivors in different studies.

Conclusion

Nevertheless the present study showed that death and functional status on the 30th day were well correlated with the initial ICH volume which could be regarded as a good indicator for each location. Such results should provide a basis for statistical studies on the prognostic factors of intracerebral haemorrhage for future studies.

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IJPMR October 2006; 17 (2): 39-40 **Short Paper**

Post Viral Encephalitis Sequelae and their Rehabilitation

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Introduction

Japanese Encepahalitis (JE) is a leading cause of viral encephalitis in Asia. It is a potentially severe viral disease that is spread by infected mosquitoes in the agricultural regions of Asia. It can affect the central nervous system and cause severe complications and death. It can be a risk to travelers to rural areas where disease is common. There is no specific treatment for it.

It is caused by an arbovirus. It is spread by the infected mosquitoes. It is one of a group of mosquito- borne virus disease that can affect CNS and cause severe complications and even death. JE virus has a complex life cycle involving domestic pigs and specific type of mosquito, i.e., *Culex tritaeniorhynchus*, which lives in rural rice-growing and pig farming regions. The mosquito breeds in flooded rice fields, marshes and standing water around planted fields. The virus can infect humans, most domestic animals – birds, bats, snakes and frogs. Mosquitoes become infected by feeding on domestic pigs and wild birds infected with JE virus. These infected mosquitoes transmit the JE virus to people by biting. After infection in human beings the virus invades CNS. Approximately 50,000 sporadic and epidemic cases of JE are reported annually from China, Korea, Japan, South East Asia, and the Indian subcontinent. It usually occurs in the summers and during fall in the temperate regions. JE virus in not transmitted from person to person directly. The incubation period for JE is usually 5 to15 days. Mortality rates range from 0.3% to 60%. It can be prevented by the use of vaccine, by avoiding mosquito bites by the use of mosquito repellants on exposed parts of the body, use of mosquito nets and insecticides. JE infected mosquitoes mostly feed during cooler hours at dusk and dawn.

The present study aimed at giving us a picture of patients suffering from Japanese Encephalitis where rehabilitation interventions were required. This study did not aim at their outcome after rehabilitation but presentation of the problems likely to be associated with the illness. This is likely to incite interest in the medical fraternity since it is not that well known in the present era and is posing a challenge in the health care services specifically requiring long term care and rehabilitation services.

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Material and Methods

A preliminary study of 18 cases of viral encephalitis including JE was undertaken to have base line information about their clinical course and sequelae at the time of their discharge (Sept to Nov 2005, peak period) from the department of Physical Medicine and Rehabilitation, K.G. Medical University Lucknow.

Rehabilitation Planning and Protocol

The following broad protocol was adopted in each case of viral encephalitis depending on the involvement.

A. Proper assessment of each case: Patients were given soft mattress on hard bed and were advised care of the back with frequent change of posture. Talcum powder on the body was used to prevent pressure ulcers. Proper positioning of all effected limbs was maintained to avoid contractures. Upper limb were kept with shoulder in 90^0 abduction, elbow in 90^0 flexion, wrist in full 30 degrees dorsiflexion and fingers in hand in the form of a grip of a cylindrical object. The lower limb was kept with hip in 30^0 abduction, knee in full extension and ankle in neutral position.

B. Passive Exercises of all effected joints were demonstrated to the parents of each case. They were advised to perform full range of movement at each affected joint, 10 times each and 5 to 6 times a day.

C. Development of postures: Every child was subjected to development of normal milestones like head control, sitting with support and then without support, crawling, standing with support and then without support and finally walking with support and then without support.

D. Training of ADL activities: Each child was given training of activities of daily life so that they can develop self esteem and independence in their day to day life. They were also advised speech therapy and counseling for their abnormal behavior as needed.

E. Nutritional Supplement- Since all these cases of JE were from low socioeconomic status having rural background hence they required nutritional supplement in the diet like plenty of milk and its products, sunlight exposure every day for one hour in the morning, fruits, calcium , iron, Vitamin B complex and Vitamin D etc.

Observations

Out of 18 cases of JE, maximum cases were males (17) and they were in the age group of 0-10 years. As per clinical presentation, 13 out of 18 were having quadriparesis and 5 were having hemiparesis. Their chief complaint was inability to stand and walk (17 out of 18) followed by loss of speech (14 out of 18 cases). In a majority of cases spasticity was present except in 2 cases where rigidity was observed. Neurogenic bladder was present in six cases, of which four patients had quadriparesis and two hemiplegia, wherein indwelling catheter was used. Abnormal behavior in the form of hyperactivity, irritability and inattention were noted in five cases.

Table No -1 : Age and Sex distribution

Age	*Male*	*Female*
0-5	5	-
6-10	9	1
11-15	2	-
Above 15	1*	-
Total	**17**	**1**

*35 year old male (JE positive) with left hemiperesis
Minimum age was 3 years

Table No – 2 : Clinical presentation versus Age

Age (in years)	*Quadriperesis*	*Hemiperesis*	
		Right	*Left*
0-15	5	-	-
6-10	8	-	2
11-15	-	2	-
Above 15	-	-	1
Total	**13**	**2**	**3**

Table No -3 : Clinical Status at the time of Discharge of cases

Clinical Status	*No of cases*	
Loss of Speech	-	14
Inability to stand	-	17
History of Seizures	-	2
Spasticity	-	16
Rigidity	-	2
Bladder Involvement	-	6
Abnormal behavior	-	5

Table No – 4 : Aids and Appliances

Name of Splint		*No. of cases*
Cock up Splint	-	4 (3 Bil & 1 UL)
AFO (BK Splint)	-	3 (2 Bil & 1 UL)
AK Splint	-	1 (Bil)

Discussion

In JE, recovery from neurological deficits takes a longtime and some problems may persist for a couple of years. Due to unaffordable prolonged tertiary care in developing countries, JE cases are usually discharged from hospital after recovery from acute phase[1]. They have reported follow up of 22 JE cases, wherein 47.3% showed complete recovery after 421 days and residual neurological problems persisted in 9 cases. According to Baruah et al, Parkinsonian feature in JE cases are rare sequelae and reported that in their series 10% cases had Parkinsonian feature at the time of discharge. In the present study there were two cases showing rigidity but Parkinsonian features were not present. In this study 8 cases came for follow up after 6 weeks and showed complete recovery in speech, bladder function and in spasticity except in one case which was showing very slow improvement in spasticity. Further long term follow up is required in the present study to highlight persistence of residual neurological sequelae in these surviving cases of JE.

Conclusion

Majority of the patients were below 10 years of age and mostly males. Quadriparesis was the most common topographical involvement followed by hemiplegia associated with spasticity. Speech was also involved in a majority of the cases. Most patients had difficulty to stand and walk and required some aids and appliances to aid in their ambulation. About one third required Foley's catheter for neurogenic bladder.

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IJPMR October 2006; 17 (2): 41-44 *Case Report*

Multiple Disabilities – Challenges in Rehabilitation

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Abstract

Traumatic spinal cord injury patients are likely to have many associated injuries. Amputations if present, narrow the rehabilitation potential of such patients. The picture gets further complicated if the mental status is questionable. A twenty three year old male patient who has been under treatment for paranoid schizophrenia suffered head injury, spinal cord injury and left wrist disarticulation following trauma. He also had left sided forefoot amputation and plantar flexion deformity of left ankle joint. Rehabilitation of this patient has been a challenge and satisfactory results were obtained with considerable modifications of assistive aids and appliances.

Key words: Multiple disability, spinal cord injury, paranoid schizophrenia, head injury, amputation, wheelchair modifications, assistive aids.

Case Report

A twenty three year old unmarried male degree student presented with a history of fall from a slowly moving train (date of injury was 1st July 2003). The nature and mechanism of injury are questionable as the patient was traveling alone. He was right hand dominant.

At the time of injury, he had external injuries on head, left hand and left foot. There was loss of consciousness 15-20 minutes after injury and he remained unconscious for 3 hours, without any bleeding from ear, nose and throat (ENT bleed) and seizures.

After dressing of wounds at a local hospital, patient was taken to the State Medical College Hospital. There, airway was maintained and bladder catheterized. Patient had experienced constipation at that time.

Amputation of left hand through wrist and of left foot through metatarsophalangeal (MTP) joints were done on 3rd July 2003 due either to infection or gangrene of crush injuries of the affected parts.

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A week after injury (10th July), patient and relatives noticed weakness of both lower limbs. The family members and the treating doctors focused only on the external injuries and it was difficult to determine whether the weakness was present and that they neglected it or the paraplegia developed later. Thus the onset of lower limb weakness is questionable. Plain radiograph revealed anterior wedge compression of 3rd lumbar vertebra with posterior dislocation. Magnetic Resonance Imaging (MRI) done on the 15th (five days after weakness noticed) confirmed Spinal cord injury (SCI) with anterior compression fracture of L3 vertebra with posterior dislocation (Fig 1).

At admission to rehabilitation ward at AIIMS Hospital (5 months after injury), patient's higher mental functions seemed satisfactory, had weakness of both lower limbs, left sided wrist disarticulation, amputation of all toes of left foot through MTP joints, tightness of both heel cords, was on condom drainage of bladder, had bladder sensations and hesitancy but no voluntary initiation of micturition or continence, and bowel sensations were present but without continence.

In the past this patient was diagnosed to have paranoid

Table 1.	
Rehabilitation Problems	**Solutions**
Paranoid schizophrenia (in remission)	Tablet Olanzepine 10mg at night, psychotherapy No symptoms at discharge, good communication
Head injury Facial nerve palsy	MMSE (Mini Mental Status Examination) did not reveal any cognitive deficit (30/30) Recovered
Diplopia (right superior oblique paralysis with squint)	No active ophthalmologic intervention
Left wrist disarticulation	Left sided below elbow type functional prosthesis (body powered) with voluntary opening terminal device
Bilateral tendoachilles tightness	Stretching exercises
Left foot amputation	Filler in left shoe and AFO
Ambulation	Wheelchair with handles on rims (Fig. 4) Walking and standing with left sided axillary crutch with forearm trough, right axillary crutch and bilateral KAFO (Knee Ankle Foot Orthosis) (Fig.5)
Bladder management	Self clean intermittent catheterization with straps for left upper limb (Fig. 6)
ADL	Training in all aspects of ADL
Socio-vocational problems	Complete graduation through distance education Tuition classes for school children for temporary income, wants to own a garment shop Counseling of family members Recreational activities

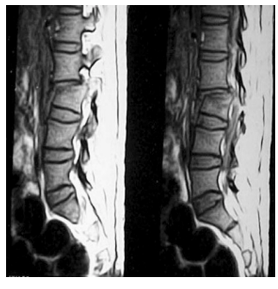


Fig 1. MRI LS Spine

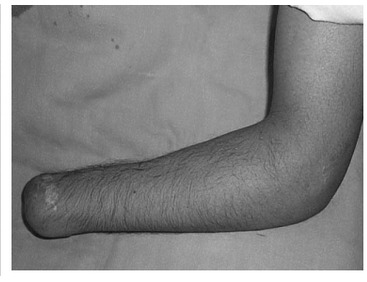


Fig 2.Residual Upper Limb

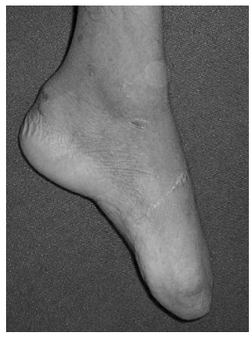
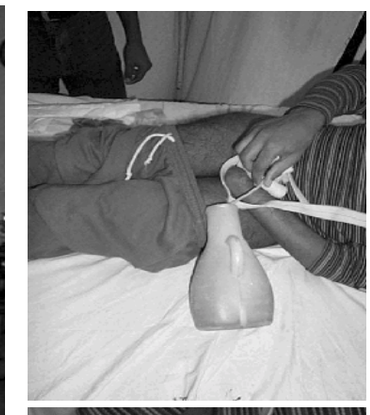


Fig 3. Residual Left Foot

Fig 4. Wheel Chair with handles on rims

Fig 5. Patient standing with Bilateral HKAFO and Crutches



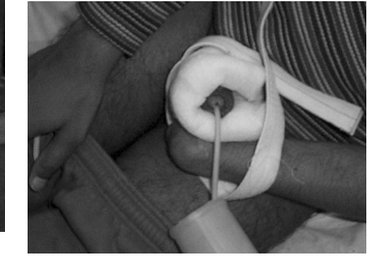


Fig 6. Patient doing CSIC

schizophrenia and was on medication. The duration of psychiatric illness and type of medication could not be elicited. Patient had denied history of psychiatric illness at the beginning of interrogation. He used to consume alcohol once a month, occasionally smoke cigarettes, and used to chew "Khaini" (a mixture of tobacco and lime) 5-6 times a day. He did not suffer from any other significant medical illness in the past.

On examination, the patient had intact higher mental functions though he had vacant look and occasional altered behavior with little interest in communication. There was right sided, lower motor neuron type, of facial nerve (7^{th} cranial nerve) palsy and right sided trochlear nerve (4^{th} cranial nerve) palsy.

There was 'Knuckle' kyphosis at L3, without tenderness. He had incomplete, flaccid, traumatic spinal cord injury with paraplegia, ASIA Impairment scale C with scores, motor – 44 / 100; sensory – 94 / 100 (both pinprick and light touch). His neurological level was motor – L1 and sensory – L1. He also had neurogenic dysfunction of bladder and bowel with urinary tract infection (UTI) at time of admission.

There was associated left sided wrist disarticulation (Fig 2) and left foot amputation through MTP joints (Fig 3). Plantar flexion contractures of both ankle joints, more on the left side (Fig 3) than right were present. Functional Independence Measure (FIM) score at admission was 61.

Ultrasonography (USG) of bladder revealed debris. Micturating Cysto Urethrogram (MCU) revealed grade I vesicoureteric reflux (VUR) on left side.

The Rehabilitation goals for this patient at the time of admission were as follows.

1 Independence in Activities of Daily Living (ADL) to the maximum possible extent.

2 Ambulation – assisted wheelchair ambulation and if possible, independent.

3. Management of bladder and bowel dysfunction.

4. Psycho-socio-vocational assessment and possible interventions.

5. Sexual and marriage counseling.

After detailed history, and thorough clinical examination, relevant investigations were ordered. Appropriate dietary modifications were done. Antibiotics were given according to sensitivity for treatment of UTI. Amitriptyline 25mg was started at night to increase the bladder capacity and the dose was adjusted to the desired effect. Olanzepine was started later after psychiatry consultation for management of the psychiatric condition.

It was difficult to initiate rehabilitation protocol as the patient did not fully cooperate and was not communicating well. However, with adequate psychiatric intervention, counseling and family support, patient was convinced that he could achieve better independence. Physical and occupational therapy were initiated along with ADL training. Psychological, social and sexual counseling were given. Vocational opportunities were explored and suitable guidance given.

An improvement in neurological status as well as mental status was noted during his hospital stay.

The management details are given in Table 1.

At discharge from our hospital, patient was cheerful, actively participating in the rehabilitation programme and eager to learn more.

The ASIA Impairment Scale was still C, but the scores had improved to motor – 51 and sensory – 94. His FIM Score was 103 (61 at admission).

He was independent in self-care activities of eating, grooming and dressing, needed minimal assistance in bathing and toileting. Though he required minimal assistance with bowel care, had modified independence in bladder management. Mobility activities required supervision. He was completely independent in wheelchair locomotion. He could ambulate to an extent with bilateral KAFO with right sided conventional axillary crutch and left axillary crutch with forearm trough without upper limb prosthesis.

Discussion

In a study of 30 patients with spinal cord lesions and depressive disorders by Fullerton et al, the accident causing the injury seemed related to a psychiatric disorder before injury in 6 patients and to drinking before the accident in 15 patients[1]. Liang et al (1996) conducted a retrospective study of clinical features and rehabilitation outcomes in 17 SCI patients with preexisting schizophrenia[2]. They found that fifteen injuries were caused by voluntary fall. Ten incomplete paraplegics were able to ambulate with or without a device. They also reported that psychiatric symptom was one of the main obstacles of rehabilitation. They concluded that rehabilitation programs were found to benefit subjects after their psychiatric problems were under control. In our patient, it was not clear whether the patient had a voluntary fall as he could not recall the events clearly or he would not tell. It is possible that he tried to hurt himself as the train was reportedly moving very slowly. The history of premorbid psychiatric diagnosis also favors this.

Another retrospective review conducted at the National Spinal Injuries Centre, Stoke Mandeville Hospital, UK, examined the cases of 137 individuals with SCI as a result of suicide attempt[3]. Schizophrenia and depression were evident in 32.8% and 27% of their cases respectively and the cause of injury in 85% was 'falls'.

Nagler (1950) in his series reported that only 3 patients had psychotic reaction in 500 spinal cord injury (SCI) cases and all had paranoid-type schizophrenia[4]. Hohmann also mentioned 18 cord injured patients with schizophrenia[5].

Our patient had amputations complicating his physical condition. Ohry et al (1983) found that only six among hundreds of SCI patients had lost one or more upper or lower limbs[6]. They reported that the clinical and psychological effects of absence of limbs are tremendous.

Davidoff et al reported that head injury may frequently be associated with traumatic spinal cord injury[7]. They worked on the fact that a loss of consciousness (LOC) of 20 minutes' duration or a post-traumatic amnesia (PTA) lasting 24 hours has been associated with deficits in concentration, attention, memory and higher-level cognitive function. These may present as significant factors influencing learning and adaptation during and after the formal rehabilitation process.

In accordance with the available literature, it can be said that rehabilitation suffers a great deal due to the psychiatric condition of the patient and takes prime privilege especially in avoidance of self-destructive behavior. Coexisting physical conditions can complicate the rehabilitation of spinal cord injury patients and special care is needed to manage such patients.

Bingham and Beatty conducted a study to determine the rates of access to assistive equipment and medical rehabilitation services among people with disabilities (only working-age adults) in the US[8]. They found that over half the sample (n=500) indicated a need for assistive equipment in the last 12 months. They also found that nearly a third of those who indicated a need did not receive assistive equipment every time it was needed. They concluded that the emphasis in healthcare for people with disabilities should shift from traditional acute healthcare models that focus on functional restoration to preventive services, and maintenance of function, health and independence. The use of assistive aids could go a long way in achieving functional independence even in patients with multiple disabilities.

One of the main factors requiring special mention that facilitated the rehabilitation of our patient is the active and enthusiastic involvement of the family members side by side with the rehabilitation team members.

Conclusion

Appropriate and timely rehabilitation interventions can bring about gratifying results even in those patients who have multiple disabilities.

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IJPMR October 2006; 17 (2): 45-48 *Case Report*

Role of Electrical Stimulation of Palate in Patients of Lateral Medullary Syndrome with Dysphagia

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Abstract

Lateral Medullary Syndrome is due to involvement of lateral wedge of medulla by vascular insult. Motor weakness is not a feature of these cases. Involvement of palatal and laryngeal muscles results in difficulty in feeding and phonation. Patients are usually sent to the Department of Physical Medicine with complaint of dysphagia and nasal intonation and usually on naso-gastric tube feeding. Two such cases were studied in Dept of Physical Medicine, Medical College Hospital, Kolkata between 1997 and 2004. Noticeable improvement was noticed with electrical stimulation of palate. No literature could be found. The above studies showed that electrical stimulation of palate may be tried in lateral medullary syndrome to hasten improvement of palatal weakness, when present. This will help early oral feeding and early socialization of the patient.

Introduction

Lateral Medullary syndrome is not uncommon and cases are usually referred from the departments of Neuromedicine or General Medicine to the department of Physical Medicine for the rehabilitation of the patient. Lateral Medullary Syndrome is due to infarction in the lateral wedge of medulla. Lateral Medullary Syndrome may be total or partial depending on the involvement of vessels supplying lateral medulla. The patients show combined features of involvement of multiple cranial nerve nuclei, cerebellum, ascending and descending tracts. Dysphagia and nasal intonation may be present due to palatal and laryngeal palsy. When present, dysphagia and nasal intonation may be annoying and cause psychological burden to the patients.

The present study was conducted in the department of Physical Medicine & Rehabilitation, Medical College Hospital, Kolkata to ascertain role of electrical stimulation of palate in patients of Lateral Medullary Syndrome dysphagia. Palatal exercise was done along with electrical stimulation of palate. Two cases were selected. First case was treated in 1997 and second one was treated in 2004. In both cases marked improvement was observed so far as palatal function is concerned. Nasogastric tube feeding could be discontinued in both cases within short time after starting stimulation of palate with galvanic current. Psychological improvement was also perceived.

Case 1

A 42 years old Hindu male, resident of Kolkata, was admitted to the Department of Neuromedicine, Medical College Hospital, Kolkata on 21.07.1997 with chief complaints of nasal intonation, nasal regurgitation, difficulties in deglutition of solid and liquid foods. There was feeling of numbness on the left side of the body from neck downwards.

The entire episode started suddenly on 19.06.1997 as electrical shock like sensation over right occipito-parietal

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region along with chocking sensation in the throat and total picture was revealed within 24 hours.

There was no history of unconsciousness, motor weakness in limbs, vertigo, tinnitus, difficulties in vision and hearing and loss of taste sensation. Bowel and bladder control was normal.

Patient was a known hypertensive for 15 years and was on antihypertensives. He was a chronic smoker (5-6 cigarette/day) but non alcoholic. He was on fabrication job in heavy industry requiring exposure to high temperature.

Initial examination in Department of Neuromedicine on 21.06.1997 showed pulse 60/minute, regular; B.P 150/100 mm. of Hg.; right sided palatal palsy, right sided laryngeal palsy, right miosis, left sided (from neck downwards) hemi-anaesthesia for pain and temperature sensation. Joint, vibration and cortical sensation were intact. There was no motor weakness of the limbs. Ophthalmic examination was normal. The case was provisionally diagnosed as Lateral Medullary Syndrome (Incomplete). Biochemical examination and CT scan of brain was normal. The patient was put on Nasogastric tube feeding .

The patient was referred to Department of Physical Medicine on 23.07.1997, about one month after admission in the Department of Neuromedicine.

On examination, the patient was found to be depressed and his main concern was feeding through nasogastric tube and his persistent nasal indistinct intonation which forbade him from proper communication and socialization.

With palatal exercises, electrical stimulation of soft palate was started. Palate was stimulated regularly for 15 minutes with galvanic current.

The patient showed gradual improvement. Gradual introduction of solid food through mouth (with nasogastric tube in place) was started from 1.08.1997 and nasogastric tube feeding was discontinued on 7.08.1997.

Electrical stimulation of palate was then discontinued, but palatal exercise was continued.

On 8.08.1997, the patient showed slight right sided palatal palsy, sluggish movement of right vocal cord and persistent numbness of left side of the body. No nasal intonation was noted. Patient was discharged on 19.08.1997 in a favourable condition with the advice of continuation of palatal exercises.

Follow-up on 30.08.1997 showed that the patient was cheerful and happy. He was doing regular palatal exercises. On examination, mild right sided palatal sluggishness with left sided sensory impairment of the body was found to be still persisting.

Case2

A 55 years old Hindu male, resident of Kolkata, was admitted in the Department of General Medicine, Medical College Hospital, Kolkata on 3.02.2004 with the chief complaints of difficulty in speech and deglutition along with choking sensation on the right side of the throat. The same evening the patient suffered from sudden onset of severe vertigo. To get relief, he sat down and then lay on the floor. But vertigo continued. As per advice of local physician the same evening he was transferred to emergency of Medical College Hospital, Kolkata. At the time of transfer his B.P was found to be 170/110 mm Hg.

On his way to hospital, the patient lost consciousness. On regaining consciousness in the Emergency Medicine ward of the Medical College Hospital in the same night, the patient noticed difficulty in speech and deglutition along with choking sensation on the right side of the throat. Annoying hiccough started late in the night disturbing his respiration. The patient was unable to walk due to disturbance of balance.

On the 10^{th} day of hospital stay, loss of temperature sensation was noticed on the left half of the body. Tactile sensation was also less on the left side. History of convulsion, disturbances of vision, hearing and taste sensation or tinnitus or headache were lacking. No motor loss of the limbs was noticed. Bowel and bladder control was normal. The Patient was a known hypertensive and under regular medication. He was an order supplier in printing press.

On initial examination, the patient was found to be alert, co-operative and anxious. His B.P. was 94/74 mm of Hg. There was 9^{th} and 10^{th} cranial nerve palsy. There was loss of temperature sensation with some loss of tactile sensation on the left half of the body. Joint, vibration and cortical sensation were found to be intact. The case was provisionally diagnosed as Lateral Medullary Syndrome (Incomplete).

Biochemical examinations were normal. CT scan of brain showed features of mild brain shrinkage with low attenuating areas in paraventricular areas. MRI of brain showed mild cerebral atrophic changes with multiple small hyperintensity in subcortical parieto-frontal region bilaterally likely of focal demyelination. A small hyperintensity in right anterior putaminal region was found, suggestive of a lacunar infarct. The right side of medulla showed focal hyperintense area likely to be an infarct.

The patient was put on nasogastric tube feeding along with other medicinal treatment. The patient was in Department of General Medicine for 22 days and then transferred to Department of Neuromedicine for further management. The patient was then transferred to

Department of Physical Medicine. On his first visit to the Department of Physical Medicine, the main complaints of the patient were nasal intonation and difficulty in deglutition. Patient was still in nasogastric tube feeding. On examination, there was right sided palatal palsy, right sided laryngeal palsy along with loss of temperature sensation and partial loss of tactile sensation of left half of the body.

With usual care for sensory loss and palatal exercises, electrical stimulation of the palate was done regularly for 15 minutes with galvanic current. Within 5 days of palatal stimulation, much improvement of dysphagia was noted. The patient was able to take even liquid with some nasal regurgitation. The nasogastric tube was removed. The electrical stimulation was continued for 2 weeks. Patient was discharged with some nasal intonation but without any deglutition problem. Sensory deficiency was persistent at the time of discharge of the patient. Patient was advised to continue palatal exercises.

Discussion

Lateral Medullary Syndrome is due to involvement of vertibro-basilar system of arteries. The two vertebral arteries join to form basilar artery at the junction of medulla and pons. The basilar artery then divides into two posterior cerebral arteries to contribute to circle of Willis at the level of upper midbrain. Together, vertebral and basilar arteries supply the brainstem by paramedian and short circumferential branches and supply the cerebellum by long circumferential branches[1]. Lateral medullary syndrome is due to occlusion of any of the five vessels-vertebral; posterior inferior cerebellar; superior, middle, or inferior lateral medullary arteries[2]. Lateral Medullary Syndrome is most often caused by occlusion of the intracranial segment of the vertebral artery. Less commonly it is caused by occlusion of posterior inferior cerebellar artery [3]. In Lateral Medullary Syndrome infarction in the lateral wedge of medulla occurs[4]. Lateral medullary syndrome is also known as the Wallenberg syndrome as it was first described Wallenberg in 1895 [4]. Depending on the involvement of area of medulla, it may be complete or partial. In our study both cases were Incomplete Lateral Medullary Syndrome. Features of complete lateral medullary syndrome are as follows [4].

In above two patients studied, the main concern of the patient was difficulty in deglutition and nasal intonation. Due to difficulty in deglutition and nasal regurgitation during oral feeding, patients were put on nasogastric tube feeding. As a result of nasal intonation patients could not produce distinct audible sound during communication. Combined effect of these two factors prevents socialization of the patients. As a result of this the first

A. On the side of the lesion	
Signs and Symptoms	**Structure involved**
Pain, Numbness, impaired sensation over half of the face	Descending tract and nucleus of 5th cranial nerve
Ataxia of the limb and falling to the side of the lesion	Uncertain- restiform body, cereballer hemisphere, olivocerebellar fibres, spinocerebellar tract.
Vertigo, nausea, vomiting	Vestibular nucleus and connection
Nystagmus, diplopia, oscillopsia	Vestibular nucleus and connection
Horner syndrome (miosis, ptosis, decreased sweating)	Descending sympathetic tract
Dysphagia, hoarseness, paralysis of vocal cord, diminished gag reflex	Issuing fibre of 9th & 10th cranial nerves
Loss of taste (rare)	nucleus of tractus solitarius. ?
Numbness of ipsilateral arm, trunk or leg	Cuneate and gracile nucleus
Hiccup	Uncertain

B. On the opposite side of the lesion	
Signs and Symptoms	**Structure involved**
Impaired pain and thermal sense over half of the body, sometimes face	Spinothalamic tract

patient became depressed and irritable. Following electrical stimulation of the palate along with palatal exercise, both patients showed rapid improvement. In the first patient nasogastric tube could be removed after about 2 weeks and in case of second patient nasogastric tube was removed within one week. No literature could be found regarding electrical stimulation of palate in patient of Lateral Medullary Syndrome with dysphagia. Dysphonia was corrected probably due to stimulation of larynx during stimulation of palate.

Summary and Conclusion

In the first case studied, we found that the patient is depressed and irritable during his first visit to the Department of Physical Medicine. Within a few days of electrical stimulation of the palate his disabilities disappeared appreciably. There was dramatic change of the mood of the patient and he became cheerful and happy.

In the second case, the patient was on nasogastric tube feeding for about one month. But after only 5 days of electrical stimulation of the palate, patient improved so much that oral feeding could be started.

From the experience of above two cases, it can be said that electrical stimulation of palate has probably got some role to hasten recovery of the patient so far as palatal function is concerned. Only two cases were studied. Before coming to a firm conclusion more cases should be studied. If repeated studies show that electrical stimulation of palate has definite role in improvement of palatal function in patient of Lateral Medullary Syndrome, then along with usual physiotherapeutic management electrical stimulation of palate with galvanic current could be added to the treatment protocol of Lateral Medullary Syndrome with dysphagia.

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