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Case Report

Dyke Davidoff Masson Syndrome: A Rare Disease Presented without Motor Weakness

Annada Sankar Mohes¹, Ngampa Sangme²,
Th Bidyarani³, L Nilachandra Singh⁴, AK Joy Singh⁵

Abstract

Medical science is full of surprises. We faced one such surprise while treating a 47-year-old male patient with difficulty in walking for 6 months duration along with occasional seizures since childhood. After thorough clinical examination and investigations, patient was diagnosed as a case of Dyke Davidoff Masson syndrome (DDMS). It is a rare syndrome due to hemiatrophy of cerebral hemisphere and associated with hemiplegia or hemiparesis. But in this case, patient had only ankle clonus, causing difficulty in walking without any other motor deficit. Alcohol neurolysis of gastrosoleus muscles was done followed by gait training and improvement of gait was noticed over time.

Key words: Syndrome, hemiatrophy, hemiplegia, clonus, neurolysis, hemispherectomy.

Introduction:

Dyke Davidoff Masson syndrome is characterised by hemiatrophy or hypoplasia of brain as a result of insult of brain during foetal period or in early childhood¹. Dyke, Davidoff and Masson first described the features of this syndrome in skull radiograph in 1933¹. It is manifested with hemiparesis or hemiplegia, seizures, mental retardation, facial asymmetry¹. Radiological features of this syndrome includes hemiatrophy of cerebral hemisphere, ipsilateral compensatory hypertrophy of skull and sinuses^{1,2}. Here we are presenting a case of Dyke Davidoff Masson syndrome without motor weakness.

Case Report:

A 47-year-old married male presented with difficulty in walking for 6 months duration. He had also history of recurrent seizures since childhood and he was on carbamazepine. Patient was walking with short stepping gait, bouncing of feet from midstance through preswing phase. Patient was examined thoroughly and no motor weakness was found. Deep tendon reflexes were increased on both sides in upper and lower limbs. Hoffmann's sign was positive on both sides. There was bilateral ankle and right sided patellar clonus. Sensory level was intact. Along with these features, facial asymmetry was also noticed. All routine investigations were found to be within normal limits. MRI of brain (Figs 1-4) showed left cerebral atrophy with dilatation of ipsilateral lateral ventricles and thickening of overlying calvarium. Patient was diagnosed as a case of Dyke Davidoff Masson syndrome. He was treated conservatively and alcohol neurolysis of bilateral gastrosoleus muscles were done to reduce the clonus causing difficulty in walking. Gait training was given to the patient and improvement of gait was noticed over time.

Discussion:

Dyke, Davidoff and Masson first described this syndrome in the year 1933^{1,2}. They described the syndrome through plain radiographic and pneumoencephalographic changes in a series of nine patients¹. Clinically this

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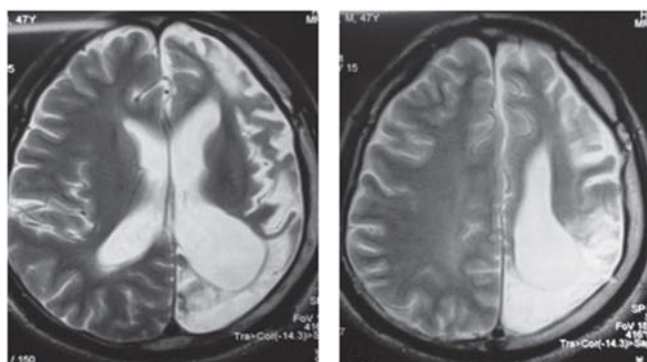
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syndrome is characterised by hemiparesis, seizures, facial asymmetry, mental retardation, etc. CT scan or MRI of brain is gold standard investigation for the



Figs 1 & 2- Axial T_2 MRI Images Showing Left Cerebral Atrophy with Ipsilateral Dilated Lateral Ventricle and Thickened Calvarium

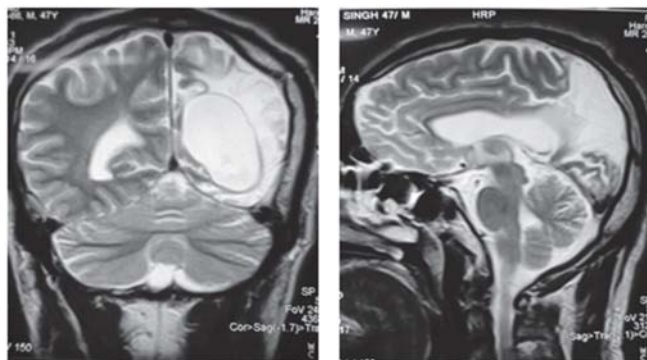


Fig 3- Coronal T_2 MRI Shows Left Cerebral Atrophy with Ipsilateral Ventricular Dilatation **Fig 4-** Sagittal T2MRI Shows Ventricular Dilatation and Myelomalacic Occipital Lobe

diagnosis of this syndrome. There is hemiatrophy of brain with compensatory hypertrophy of opposite hemisphere, resulting in midline shift of brain to the affected side^{2,3}. Other features are unilateral thickening of skull, dilatation of ventricle and cisternal space, enlargement of ipsilateral sulci, dilatation of ipsilateral frontal and ethmoid sinuses^{1,4}.

Aetiology of cerebral hemiatrophy can be divided into congenital or primary and acquired^{5,6}. Congenital causes can be idiopathic or intrauterine cerebral vascular injury. Acquired causes are birth trauma, perinatal intracranial haemorrhage, Rasmussen encephalitis, infection, Sturge-

Weber syndrome, etc⁵. Dyke Davidoff Masson syndrome, thus can be congenital or acquired and it is commonly due to vascular insult involving middle cerebral artery^{5,7}.

Brain reaches half of adult size by the age of 1 year and three-fourths of the adult size by 3 years. Therefore, if vascular insult occurs before 3 years of age, there will be compensatory thickening of calvarium and enlargement of sinuses to fill the vacuum created by hypoplastic brain. If the insult occurs in intrauterine life, there will be shifting of midline structures towards the affected side and prominence of sulci replacing absent gliotic tissues. These features can differentiate affection of brain in utero from early life². During diagnosis, other causes of cerebral hemiatrophy should be excluded.

Treatment of DDMS is symptomatic targeting convulsion, hemiparesis, learning difficulties, etc. Patients with intractable disability and refractory seizures are candidates for hemispherectomy with 85% success rate. Good prognostic indicators are onset of hemiparesis after 2 years of age and absence of recurrent or prolonged seizure².

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Polio Free India - Achievements and Risks

27 March 2014 is a red letter day in the Public health history of India, when India, along with 10 other countries in South-east Asian region of WHO was declared polio-free. By that time over three years had passed after the last wild polio virus was identified on 13 January 2011 in Panchla block of Howrah district of West Bengal.

This achievement has dumbbed many international and national critics who had commented that India would be the last country in the world to clear polio and also criticised the polio eradication strategy adopted by India .

What made this so called "unbelievable" possible ?

The very important were the highest level of political commitment at national and state levels, excellent support by major partners – WHO, UNICEF, Rotary International and CDC Atlanta, high quality of laboratory and field based research for development of new vaccines and immunisation strategies – bivalent oral polio vaccine that was first used in 2010 and gave the final blow to circulating type 1 and type 3 wild polio virus, was a product of research carried out in India.

But the most important factor were millions of vaccinators from health and non-health sectors who had literally knocked at every door from Kashmir to Kanyakumari and from Kutch (Gujarat) to Lohit (Arunachal), multiple times a year to ensure two drops of oral polio vaccine to each and every child in the country. Extremes of weather, floods, landslides, poor law and order, could not prevent these dedicated missionaries from carrying out their mission.

But in the light of ongoing wild polio virus circulation in three endemic countries, Pakistan, Afghanistan, Nigeria and in number of African and middle eastern countries affected by wild polio virus importation, our achievement appears fragile. High degree of international population movement in this jet age, may bring wild polio virus any time to India, till polio is anywhere on this globe.

Our top priority today and till the world is declared polio-free, is to maintain a very high level of immunity against polio in our child population. This can only be achieved through sustained high level of routine immunisation with polio vaccine and time to time national / sub national immunisation days; ensuring that no pockets is left poorly immunised both in routine programme and in campaign.

Based on recent research findings, government is going to introduce IPV (inactivated polio vaccine) in our national immunisation schedule in near future.

Simultaneously, we will have to maintain a highly sensitive surveillance system for AFP (acute flaccid paralysis) to identify any importation of wild polio virus or emergence of VDPV (vaccine derived polio virus).

We have crossed one hurdle – made the country and region polio-free. We will have to run with greater zeal and enthusiasm to complete the race and reach the finishing line – a polio-free world !

– R. N. Haldar

Association of Low Back Pain with Common Risk Factors: A Community Based Study

Aminuddin A Khan¹, Mohammad Moin Uddin²,
Ahsanul Hoque Chowdhury³, Ranjan Kumar Guha⁴

Abstract

Background: Low back pain is very common in Asian communities. It is a major cause of activity limitation. Its risk factors were not studied well in Asian communities. This study was performed in the rural area to see the association of some common posture related and modifiable risk factors of low back pain.

Methods: This is a community based case-control study. Participants of both sexes between 30 and 60 years were selected who had low back pain. Data were collected with a semi-structured questionnaire and fifty-one participants were interviewed from which 32 had back pain (cases). Risk factor association was compared with age and ethnicity matched 19 patients without low back pain (control group).

Results: The point prevalence of low backache was 63%. Mean age of the patients was 45.8 (± 10.8 SD) years. Seventy per cent of the back pain patients were females and 30% were males. Back pain was significantly associated with the risk factor 'bending and twisting movements of the body' (OR= 4.6 with 95% CI= 1.1 to 18.9, $p= 0.041$). It was not found to be significantly associated with the other studied risk factors.

Conclusion: Low back pain had a very high prevalence in rural Bangladesh. Bending and twisting movements of spine was the only posture related significant risk factor of low back pain.

Key words: Bangladesh, case-control, low back pain, prevalence, risk factors.

Introduction:

Low back pain (LBP) is an extremely common health problem¹⁻⁴. Until 10 years ago, it was largely thought

of as a problem confined to Western countries⁵; however, since that time an increasing amount of research has demonstrated that low back pain is also a major problem in low- and middle income countries⁶⁻⁹. Low back pain is the leading cause of activity limitation and work absence throughout much of the world¹⁰, and it causes a great economic burden on individuals, communities and governments¹¹⁻¹³.

The point prevalence of LBP is 28.5% found in an Asian country¹⁴. The lifetime prevalence of low back pain is reported to be over 70%¹⁵. But globally, the annual prevalence of LBP has been estimated at 38%. In general, LBP resolves within weeks, but may recur in 24-50% of cases within 1 year. Thus, the identification of risk factors for LBP is important in the prevention of recurrent and possibly chronic LBP¹⁶. The prevalence of LBP in children is low (1%-6%)¹⁷ but increases rapidly (18%-50%) in the adolescent population^{18,19}. The prevalence of LBP peaks around the end of the sixth decade of life²⁰.

The age distribution of LBP is unimodal, with the peak prevalence occurring in those aged 45 to 59 years old. This is also similar to USA epidemiological data

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describing the peak point prevalence, period prevalence and lifetime prevalence all within ages 55 to 64 years²¹.

Low back pain is pain, muscle tension, or stiffness, localised below the costal margin and above the inferior gluteal folds, with or without referred or radicular leg pain (sciatica)²². Low back pain is typically classified as 'specific' and 'non-specific'. Specific LBP is caused by specific pathophysiological mechanism whereas non-specific LBP is defined as symptoms due to non-specific cause, i.e. LBP of unknown origin. LBP is defined as acute when persists less than 6 weeks, subacute between 6 weeks and three months and chronic when lasts longer than 3 months. Approximately 90% of all LBP patients have non-specific causes²³.

The most important symptoms of LBP are pain and disability (activity limitation). Recently it has been suggested that a substantial proportion of patients with chronic LBP have widespread pain^{24,25}.

Different anatomical structures and pathophysiological functions can be responsible for lumbar pain, each producing a distinctive clinical profile. Pain can arise from the intervertebral disc in which case, greatest pain provocation will be associated with movements and functions in the sagittal plane. Lumbar pain can also arise from afflictions within the zygapophyseal joint mechanism, which will produce the greatest pain provocation during three-dimensional movements, due to maximal stress to either the synovium or joint cartilage. Finally, patients can experience pain associated with irritation to the dural sleeve, dorsal root ganglion, or chemically irritated lumbar nerve root. Pain can also arise from muscle²⁶.

More than 100 risk factors for LBP have been identified²⁷. In the majority of cases, a combination of individual and work-related as well as non-work-related factors is likely to contribute to the development of LBP²⁸. A wide range of work-related mechanical risk factors for LBP have therefore been reported in prospective studies. They include 'bending or twisting'^{29,30}, 'kneeling or squatting'³¹, 'prolonged standing'³², 'heavy physical work'^{33,34}, and 'nursing tasks' (e.g., manually moving patients)^{35,36}. Overall, however, the evidence showing works postures, manual handling and carrying to be risk factors for LBP remains inconclusive³⁷.

In recent decades, there has been increased emphasis on work-related psychosocial factors in epidemiological studies of LBP. There is some evidence that psychological demands^{38,39}, and high job strain⁴⁰ are

related to LBP. Lack of social support has been demonstrated to increase the risk of sick leave associated with LBP⁴¹. However, the level of evidence for most psychosocial factors is limited^{42,43}. Smoking behavior^{44,45}, Life style, lack of physical exercise⁴⁶ and short sleep hours⁴⁷ are also found to increase the risk of LBP

Aging is a well known risk factor of LBP as degenerative changes in the spine and disc are one of the major causes of LBP⁴⁸. Previous studies reported the association between age and LBP among Asian population⁴⁹ as well as the western population^{46,50}. The association between gender and LBP had been reported by previous studies^{44,45}. A systematic review showed that there was no evident relationship between alcohol consumption and LBP⁵¹.

Low back pain is one of the major causes of activity limitation and work absence throughout much of the world¹⁰. It is the second most common reason for visits to physicians⁵². The point prevalence of LBP is 28.5% found in an Asian country¹⁴. Seventy per cent people have the chance of developing LBP at least once in life¹⁵. The economic burden of this disease is enormous. Although data from Asian countries are not available, the Quebec Workers Compensation System showed that the LBP was responsible for 73% of the medical costs, and 76% of the compensation costs⁵³. In UK its treatment cost is 500 million pounds a year at the GP level⁵⁴. So it is important to chalk out the risk factors for LBP in order to take preventive measures and to reduce the posture related modifiable risk factors among the rural people of our country.

Materials and Methods:

Study design and settings

It is a community based case-control study done at 'Bangladesh Academy for Rural Development' (BARD), Kotbari, Comilla, Bangladesh. Data were collected from Raichaw village of Comilla and analyzed at BARD.

Participants and procedure

Participants were selected from the inhabitants of Raichow village by non-probability sampling. Both male and female participants were chosen whose age between 30 and 60 years. Total 51 participants, irrespective of their gender, were interviewed consecutively. Severely ill patients (e.g., stroke, MI, paraplegic patients), pregnant women, patients with history of inflammatory back pain (morning stiffness >30 minutes), patients with 'red flag' symptoms were exempted from the purview

of the study. People unwilling to give interview were also excluded. Patients who had back pain previously, but not at the time of interview, were not included.

Participants within the specified age group who had the complaints of LBP at the time of data collection were defined as '**LBP**' group (case). Age and ethnicity (people of same village) matched patients with no LBP were allocated as '**no LBP**' group (control). Total 32 patients were included as cases and 19 patients as controls.

Data collection

A semi-structured questionnaire was used to interview and collect data. The questionnaire included three open ended and eight closed ended questions. People were interviewed and questionnaires were filled up by the interviewers. The interviewers went from home to home and talked to the people within 30 to 60 years.

Statistical analysis

Data were edited, checked and verified manually. Data were analysed and presented by the help of SPSS-V15. Association of risk factors with LBP was seen by odds ratio (95% CI), Chi-square test and likelihood ratio. Strength of association was examined by Phi & Cramer's V test. P value <0.05 was used to see level of significance.

LBP and risk factors

Low back pain (LBP) is pain, muscle tension, or stiffness, localized below the costal margin and above the inferior gluteal folds, with or without referred or radicular leg pain (sciatica)²². Demography means the study of the characteristics of human populations, such as size, growth, density, distribution, and vital statistics. Here we used age, gender, occupation, religion and marital status⁵⁵. Activities related to different body postures like 'bending and twisting movements of spine'^{29,30}, 'kneeling and squatting movements of the body'³¹, 'prolonged standing'³², 'and heavy physical works'^{33,34} were assessed in this study.

For 'bending and twisting movements' participants were asked, 'Do you work in positions where you are leaning forward without supporting yourself on your hands or arms?' For 'kneeling and squatting' they were asked, 'Do you need to squat or kneel in the course of your work?' And for standing, 'Do you work standing up?' (Response categories: yes/no). Heavy lifting was measured with a single item: 'Do you have to lift anything that weighs more than 20 kg on a daily basis?'¹⁶ Some other modifiable risk factors like 'smoking'^{44,45} at present or in the past, 'history of trauma to the back'⁴⁶ within 4 weeks prior to back pain and 'sleeping less than 6 hours' in 24 hours⁴⁷ were also studied.

Results:

Among 51 participants, 32(63%) had LBP and 19 (37%) did not. The point prevalence of LBP was 63% . Mean age of the 32 LBP patients was 45.8 (± 10.8 SD) years; median age was 48 years (Fig 1). Seventy per cent of the LBP patients were females and 30% were males (Fig 2). Regarding occupation, around 70% were housewives, 18% were farmers, 6% were businessmen and the rest 6% were unemployed (Fig 3).

Around 94% of all the back pain patients were married, 3% were single and 3% had other marital status. Mean duration of LBP was found 3.5 (± 2.5 SD) weeks among the villagers. Median duration was 3 weeks (Fig 4). Sixty seven per cent of the LBP patients consulted with physicians and 82% of them had the knowledge that body movements are related to development of LBP.

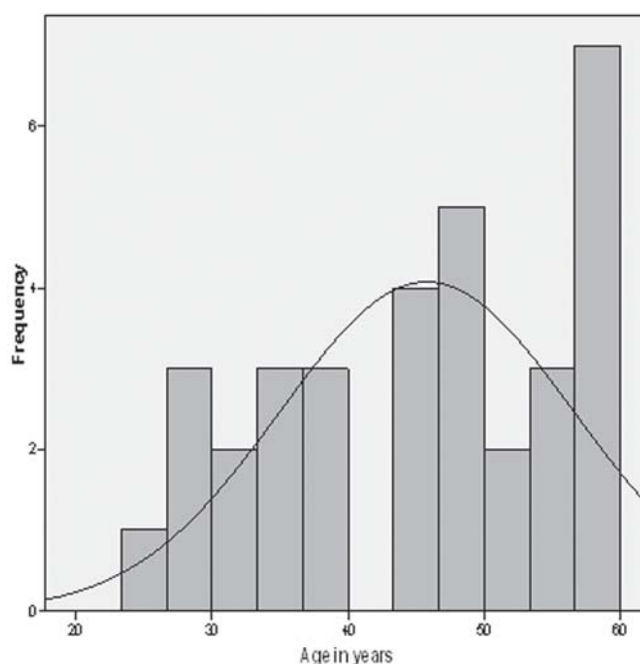


Fig 1- Histogram Showing Mean Age of LBP Patients and Frequency Distributions

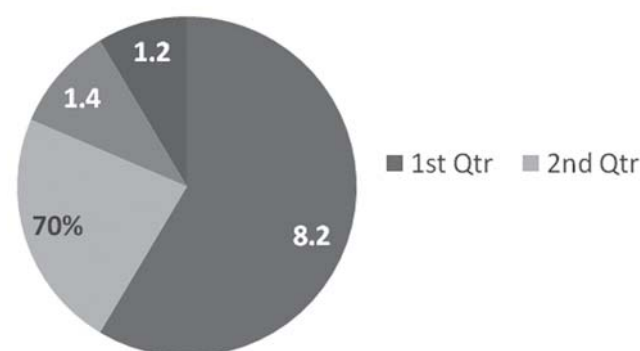


Fig 2- Pie Diagram Depicts Gender Variations in LBP

LBP was associated with the only posture related risk factor- ‘bending and twisting movements of the body’ (odd’s ratio 4.6 with 95% CI=1.1 to 18.9). There was statistically significant association of LBP with bending and twisting movements ($p=0.041$). Likelihood ratio also significant ($p=0.04$). Good strength of association ($p=0.041$) between LBP and bending and twisting movements. LBP was not found to be significantly associated with the other risk factors kneeling and squatting (OR=1.18, 95% CI=0.38-3.67, $p=0.30$), prolong standing (OR=3, CI= 0.57-15.7; $p=0.14$), heavy

working (OR=2.26, CI=0.6-8.4; $p=0.15$), back trauma (OR=1.6, CI=0.36-6.4; $p=0.84$), smoking (OR=0.94, CI=0.23-3.7; $p=0.57$), sleeping <6 hours/day (OR=1.7, CI=0.46-6.5; $p=0.83$) (Table 1).

Discussion:

This study was undertaken to see the demographic patterns of LBP in rural Bangladesh and to look into its association with some common risk factors in the perspective of Bangladeshi villagers. We found the point prevalence of LBP is much higher (63% than contemporary studies for example 29% (Tomita *et al*¹⁴.) but Kent *et al*¹². showed point prevalence may vary widely from one region to another which might be due to variation in sample and sampling technique.

Mean age of LBP patients was 45.8 (± 10.8 SD) which is a bit lower than the value (peak age 45 to 59 years) shown by Kent *et al*¹². Like previous other studies^{44,45} where female were found to suffer more from LBP, we found similar results (70% females) although more female predominance is due might be to more female participants in our study. Another contributing factor for female vulnerability is their occupation (housewife) which involved ‘bending and twisting’ movements of the spine. 70% of our participants and all female participants were housewives.

Association between LBP and none of the risk factors were statistically significant except ‘bending and twisting movement’ of the spine which is supported by Tomita *et al*¹⁴. in their study on Thai population. But he showed in his study a significant association with LBP and history of back injury, smoking. Duration was not associated with LBP in that study¹⁴.

Squatting/kneeling, prolonged standing, heavy lifting was also significant in the study at Thailand¹⁴ which is not consistent with ours. Most of our participants were young and smoking history for short time. This may be a possible explanation of lack of association because Miranda *et al*⁴⁶ showed association of LBP with smoking in only over 50 years population.

Conclusion:

Association between LBP and ‘bending and twisting movement’ was statistically significant. The study revealed a high prevalence of back pain in rural area. Females were considerably more sufferers from back pain. Backache was found more predominant in middle and older age group. Multi-centered study in future on

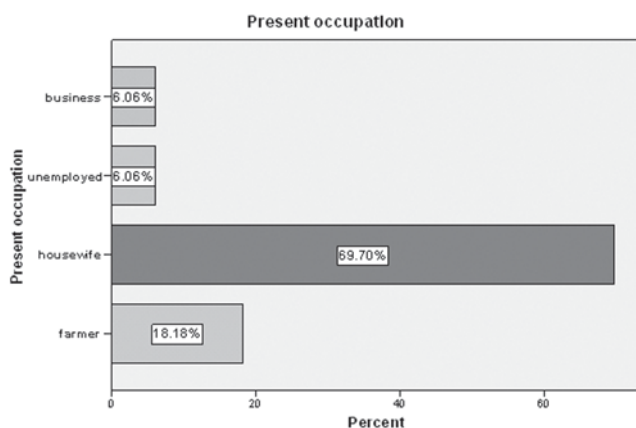


Fig 3- Bar Diagram Showing Different Occupation of LBP Patients

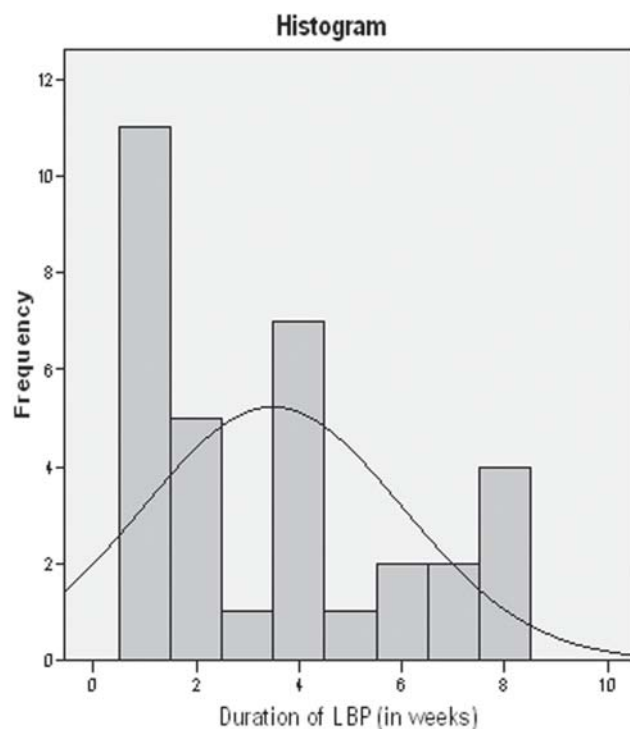


Fig 4- Histogram Demonstrates Frequency Distribution of Back Pain Duration

Table 1: Showings Association of Different Risk Factors with LBP

Risk factors	OR & CI	X ² value & p-value	Likelihood ratio & p-value	Phi & Cramer's V test (P-value)	Remarks
1) Bending and twisting	4.6 CI= 1.1-18.9	4.1 (df=1) P= 0.041	4.06 (df=1) P= 0.044	P= 0.041	Statistically significant association
2) Kneeling and squatting	1.18 CI= 0.38-3.67	1.04 (df=1) P= 0.3	1.03 (df=1) P= 0.31	P= 0.3	No significant association
3) Prolong standing	3 CI= 0.57-15.7	2.18 (df=1) P= 0.14	2.37 (df=1) P= 0.12	P= 0.14	Do
4) Heavy working	2.26 CI= 0.6-8.4	2.05 (df=1) P= 0.15	2 (df=1) P= 0.15	P= 0.15	Do
5) Back trauma	1.6 CI= 0.36-6.4	0.04 (df=1) P= 0.84	0.04 (df=1) P= 0.84	P= 0.84	Do
6) Smoking	0.94 CI= 0.23-3.7	0.31 (df=1) P= 0.57	0.32 (df=1) P= 0.57	P= 0.57	Do
7) Sleeping <6 hours/day	1.7 CI= 0.46-6.5	0.04 (df=1) P= 0.83	0.42 (df=1) P=0.83	P= 0.83	Do

larger population might be required in future to explain the findings.

Conflict of interest:

I declare no conflict of interest with anybody.

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The Role of Musculoskeletal USG as Diagnostic Tool of CTS

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Abstract

Introduction: Over the years NCS has been used to diagnose and monitor the patients with CTS though USG has several advantages as diagnostic tool. This study has been done to find out the diagnostic accuracy of USG in CTS and to compare the efficacy of USG with standard NCS in CTS.

Prospective cross-sectional analytical study was conducted at Dept. of PM&R, IPGME&R, Kolkata from 1st March, 2012 to 31st August 2012 (6 months). Patient with clinical diagnosis of CTS of age >18 year of both sexes were included in this study and on the other hand patient with previous wrist surgery /injury, wrist deformity, diabetes mellitus, anatomical variants of median nerve on ultrasound were excluded from the study.

Methodology: After getting institutional ethical committee clearance, all patients who fulfil the above criteria were included in the study and further diagnostic conformation done by the standard diagnostic criteria of NCS. The same group of patients have been also screened by ultrasonography (USG).

Results: At the end of the study, data analysis showed that sensitivity and specificity were 92.3 and 70.0% respectively. Predictive value of +test, predictive value of -test were 88.9 and 77.8% respectively. Kappa value was 0.64 (between 0.5 and 0.7). It signifies that there is good correlation between NCS and USG as diagnostic tool of CTS. The comparison of the numerical values of median latency, amplitude and CSA USG within the groups with the help of ANOVA followed by Tukey's test showed that there was good correlation between latency and amplitude in mild, moderate, severe and profound CTS but unfortunately it was not correlated with the CSA measured by USG.

Conclusion: USG can be used for screening large population of patients as it is simple, easily available, non-invasive test and has relatively low cost and useful in evaluating and excluding local causes of nerve compression.

Key words: Nerve conduction studies, ultrasound, carpal tunnel syndrome.

Introduction:

Carpal tunnel syndrome (CTS) is the compressive neuropathy of the median nerve as it passes under

the flexor retinaculum at the volar aspect of wrist¹. It is characterised by numbness and pain in the lateral three digits. In advanced cases there may be wasting of thenar muscles^{2,3}. There is an estimated 9% prevalence of carpal tunnel syndrome among adult women and 0.6% prevalence among adult men⁴. The diagnosis of CTS is usually made on a combination of clinical signs such as the Tinel sign and the Phalen sign and electrophysiological examination. Although nerve conduction studies (NCS) provide important information, it has 95% specificity and a sensitivity ranging from 49% to 86%⁵. Nevertheless, an electrodiagnostic study remains an expensive and technically demanding time-consuming procedure and is not easily accessible for many physicians. NCS indicate the level of the lesion but they do not provide spatial information about the nerve and its surroundings that could help in determining its aetiology. Not only that but also NCS cannot diagnose clinically mild cases of CTS⁶. In recent

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years the imaging techniques like MRI and ultrasound have been shown to be of value in the diagnosis of CTS. Both of these show the anatomy of the carpal tunnel and the morphology of the median nerve quite accurately, and therefore provide information about local causes of CTS, which cannot be gained by the NCS³. Advances in ultrasound technology have made it possible to achieve a good spatial resolution for clear evaluation of the peripheral nerves. Wide availability, lower cost, non-invasiveness and shorter examination time are the advantages of sonography for primary evaluation of CTS. Usefulness of USG in the diagnosis of carpal tunnel syndrome are already reported in different literatures⁷.

Many authors believe that the electrophysiological study may be used as the gold standard for the confirmation of clinically diagnosed CTS⁸. Mohammadi *et al*⁶ showed that a combination of clinical findings and the electrophysiological study may be used as the gold standard.

Ultrasound techniques using high frequency transducer of 7-15 MHz provide excellent display of carpal tunnel and superficially situated median nerve. Quantitative analysis may prove useful in the diagnosis of nerve entrapment at carpal tunnel. Studies carried out so far show that in CTS, the cross-sectional area of median nerve is increased more than 10mm² when measured at proximal boundary of carpal tunnel (as compared to 6mm² to 9mm² in asymptomatic individuals). There is anterior bowing of flexor retinaculum more than 2.5mm from a line drawn from tubercle of triquetrum to the hook of hamate bone and is flattening of the median nerve at tunnel outlet. The present study was carried out to find out the diagnostic accuracy of ultrasound in comparison with NCS, being cheap, easily available and quick to perform non-invasive test³. This study was also performed to determine whether sonography might be an alternative method to nerve conduction study in the diagnosis of carpal tunnel syndrome.

Materials and Methods:

This cross-sectional analytical study was conducted in the Department of Physical Medicine and Rehabilitation of IPGME&R, Kolkata, India from 1st March, 2012 to 31st August 2012 (6 months). After getting institutional ethical committee clearance, patients of both sexes between 20 and 60 years of age, with symptoms of nerve compression at wrist were included in the study group according to following inclusion and exclusion criteria.

Inclusion criteria:

- Patient with clinical diagnosis of CTS
- Patient who give consent
- Age >18 years
- Both sexes

Exclusion criteria:

- Patient who did not give consent
- Age <18 years
- Patients with previous wrist surgery /injury, wrist deformity
- Diabetes mellitus
- Anatomical variants of median nerve on ultrasound.

Clinically confirmed cases of CTS are assessed based on phalen sign, tinel sign, tenderness and VAS was recorded and severity grading was done. Total 36 wrists were included, of which each wrist was considered separately in the clinical diagnosis. Thereafter all patients had undergone nerve conduction study and ultrasound study to confirm the diagnosis.

All patients had high resolution real time ultrasound (USG) of the wrist with a 12 MHz linear transducer. The patient was made to sit in a comfortable position on a stool facing the examiner. The forearm was resting on the table with palm in a supine neutral position and the fingers in a semi flexed position. The ultrasound examination was started at the proximal boundary of the carpal tunnel at the intersection of the distal transverse wrist crease with the longitudinal wrist crease. The carpal tunnel appears as a lentiform hypoechoic area at the anterior aspect of wrist bounded medially and laterally by strongly reflecting bones and anteriorly by flexor retinaculum which appears as an echogenic linear structure slightly convex anteriorly. The median nerve here was identified on the basis of its superficial position at the radial aspect of the carpal tunnel, its internal fascicular echotexture, isotropy and lack of motion in contrast to the moving tendons as the fingers were extended and flexed. After identification of the median nerve, it was imaged from approximately 4 cm proximal to the wrist crease to distally until the median nerve was no longer visible. The mobility of the median nerve was exhibited as slight rocking caused by the movement of adjacent tendons as the fingers were flexed and extended one by one. Next, the median nerve was imaged in a sagittal plane (Figs 1&2). The continuity of the median nerve, any area of constriction and irregularity of the outline were assessed. Thereafter the entire carpal tunnel was scanned from side to side.



Fig 1- Showing the Median Nerve



Fig 2- Showing the Median Nerve

The median nerve cross sectional area (CSA) was measured in mm^2 . This was done in a transverse plane and taken at the level of the proximal wrist crease. The pisiform bone was taken as a landmark. To ensure the consistent transverse images and that measurement of a true cross-sectional area the following precautions were taken.

- (i) The ulnar artery was identified in cross-section just medial to the longitudinal wrist crease along the ulnar aspect.
- (ii) The probe was kept perpendicular to the long axis of the nerve.

To take the measurements the cursor was placed at the echogenic rim around the nerve and the area was traced along that echogenic rim. The area was displayed only when the final trace was complete.

NCS measurements were done by included median nerve motor and sensory distal latencies and sensory conduction velocities of symptomatic wrists using RMS EMG EP MK II software. A sensory latency longer than 3.5 m/second and a motor latency longer than 4.4 m/second were considered abnormal. Normal ulnar nerve motor and sensory latencies with increased median nerve latencies were considered diagnostic of CTS.

Data Analysis and Results:

All the data collected were entered in computer programme statistical version 6 and analysed. The qualitative variables analysed were sex and history of present illness. The quantitative variables analysed were age and median nerve measurements i.e. cross sectional area and distal motor latency (DML). Sensitivity, specificity, diagnostic accuracy and predictive values were calculated.

In our study, there were total 28 patients of which 8 had bilateral involvement. Mostly female patients ($n=24$, 85.71%) had suffered from CTS, though there were 4 (14.29%) male patients in our study. We have tabulated the data (Table 1) taking NCS as the gold standard for the diagnosis of CTS.

Table 1: Comparative Diagnostic Table Using NCS as Gold Standard

Test result (USG)	Positive	Negative	Total
Positive	24	3	27
Negative	2	7	9
Total	26	10	36*

*8 had bilateral movement

From the above data calculated sensitivity and specificity were 92.3 and 70.0% respectively. Predictive value of +test, predictive value of -test were 88.9 and 77.8% respectively (Table 2).

Table 2: Diagnostic Value of USG versus NCS

Variables	Percentage	95% CI
Sensitivity	92.3	74.9 - 99.1
Specificity	70.0	34.8 - 93.3
Predictive value of +test	88.9	70.8 - 97.7
Predictive value of -test	77.8	40 - 97.2

Interestingly it was noted that the Kappa value was 0.64 (between 0.5 and 0.7). It signifies that there is good correlation between NCS and USG as diagnostic tool of CTS. Then we have classified the hands in four groups as mild, moderate, severe and profound according to NCS criteria and have calculated the mean CSA of median nerve by USG. We have also calculated mean latency and mean amplitude of median nerve for all 4 groups.

Table 3: : Correlation between Latency and Amplitude

Variables	Mild	Moderate	Severe	Profound
No of cases	11	12	7	6
Mean lat + SD	5.69 ± 1.890	7.02 ± 1.501	8.97 ± 1.873	15.00 ± 0.000
Mean amp + SD	10.91 ± 4.028	12.28 ± 3.976	4.99 ± 3.654	0.00 ± 0.000
Mean CSA USG + SD	9.44 ± 1.694	10.88 ± 2.066	10.54 ± 1.959	10.88 ± 1.118

The comparison of the numerical values of median latency, amplitude and CSA USG within the groups with the help of ANOVA followed by Tukey's test showed that there was good correlation between latency and amplitude in mild, moderate, severe and profound CTS but unfortunately it was not correlated with the CSA measured by USG (Tables 3&4).

Again Table 4 shows that there is good correlation between latency and amplitude in mild, moderate, severe and profound CTS as per different methods of standard calculation.

When we did the comparison between the groups with the help of Pearson's correlation coefficient it became obvious that there was good correlation between

amplitude and latency parameter of NCS with severity of CTS (Table 5). The same analysis failed to show correlation between CSA and severity of CTS. The analysis was further strengthened by the plotted scattered diagrams below (Figs 3&4).

Discussion:

This prospective study conducted in Department of PMR, IPGMER over six months time showed that females were common victims of CTS as per our diagnostic tools. As per the current literature ultrasonography is a reliable method for the diagnosis of CTS. In comparison with NCS, ultrasonography is not effective to assess the physiologic condition of the median nerve but clearly

Table 4: Comparison of Numerical Variables between Groups - One way ANOVA followed by Tukey's Test

Variables	Sum of squares	df	Mean square	F	Significance
Lat					
Between groups	366.887	3	122.296	48.000	.000
Within groups	81.530	32	2.548		
Total	448.417	35			
Amp					
Between groups	755.175	3	251.725	19.354	.000
Within groups	416.214	32	13.007		
Total	1171.390	35			
CSA USG					
Between groups	14.540	3	4.847	1.478	.239
Within groups	104.928	32	3.279		
Total	119.468	35			

Table 5: Correlation between NCV Parameters and CSA by USG - Pearson's Correlation Coefficient

Variables	Lat	Amp	CSA USG
Lat			
Pearson correlation	1	-.611**	0.164 (poor)
Significance (2-tailed)		.000	.340
No of cases	36	36	36
Amp			
Pearson Correlation	-.611**	1	-0.130 (Poor)
Significance (2-tailed)	.000		.450
No of cases	36	36	36
CSA USG			
Pearson Correlation	.164	-.130	1
Significance (2-tailed)	.340	.450	
No of cases	36	36	36

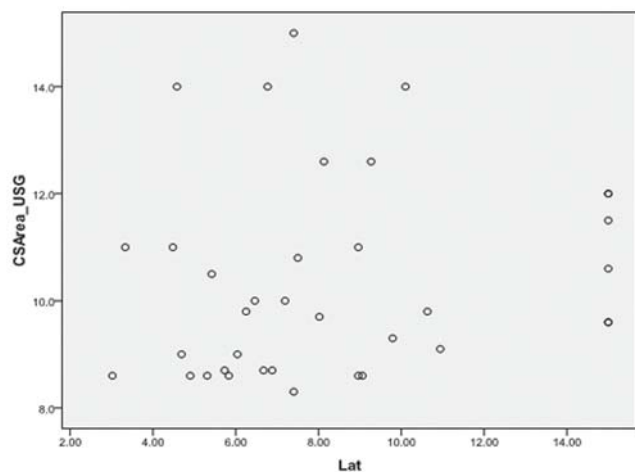


Fig 3- Scattered Diagramme Showing Poor Relationship between CSA USG and Lat

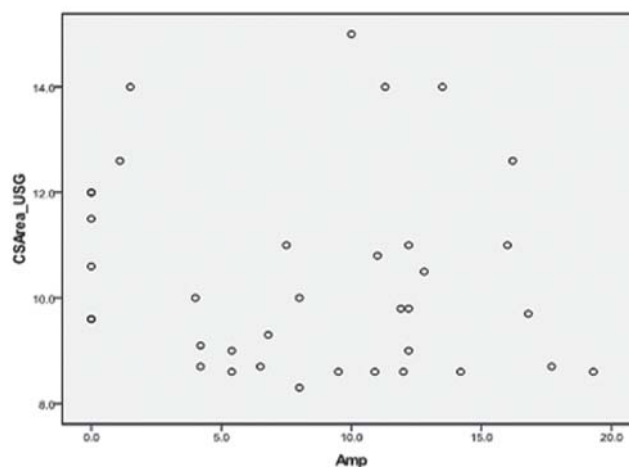


Fig 4- Scattered Diagramme Showing Poor Relationship between CSA USG and Amp

frame the swelling and tenting of the median nerve in CTS. The different measurement criteria of USG technique in diagnoses of CTS has been carried out in various studies. The most persistent criteria followed in different studies i.e. increased cross-sectional area of median nerve just proximal to the flexor retinaculum i.e. at pisiform bone has been followed up in this study. Most likely cause of taking this level is proximal swelling as a result of distal compression as the median nerve dips posteriorly under the flexor retinaculum^{3,7}.

To calculate the sensitivity and specificity of ultrasound as a diagnostic test the NCS results were taken as gold standard. A cut off point of 9mm² or higher for the median nerve cross sectional area on ultrasound and a value of >4.4 m/second for median nerve DML on NCS was used in our study. As per our statistical calculation it was found that ultrasound had 92.3% sensitivity. Out of 26 cases of confirmed CTS by nerve conduction studies, ultrasound correctly diagnosed 24 cases but failed to pick up two cases. Specificity of ultrasound was found to be 70% because ultrasound correctly identified 7 non CTS cases out of 10 who were diagnosed negative for CTS by NCS. The sensitivity of our study was corroborated well by the study done by Weisler *et al*⁷ (91% sensitivity) though they used different cut off point of 11mm². The specificity in Weisler's study was 94% which was quite high because it was calculated from data of 43 asymptomatic individuals (72 of 86 wrists). In another study Lee *et al*⁹ found 88 % sensitivity possibly due to higher cut off point (15mm²) for area measurement. The specificity in their study was calculated as 96% and diagnostic accuracy was 92%. In different evidences sensitivity of USG were reported as 73% by Sarria

*et al*¹⁰ and 70% by Swen *et al*¹¹. But Sarria *et al*¹⁰ used a cut off point of 11mm² for the cross sectional area and a value >4.2 m/second for the DML of median nerve thereby reducing the sensitivity as well as specificity (57%) (as compared to the present study). In a study by Swen *et al*¹¹ the cut off point of 10 mm² was used with a cut off value of >4.3 m/second for the DML thereby further lowering the sensitivity (70%) but increasing the specificity (63%) which is equal to the present study. Here we want to measure not only the parameters but also the diagnostic criteria of CTS used by Swen *et al*¹¹ were also different. The positive and negative predictive values of our study population were 88.9% and 77.8% respectively.

The diagnostic accuracy in the present study is almost equal to 88% diagnostic accuracy given by Duncan *et al*¹². In other studies the diagnostic accuracy of studies was reported as 68% (by Sarria *et al*¹⁰ and by Swen *et al*¹¹). As mentioned earlier, different diagnostic criteria and cut off values were used in those studies³.

Magnetic resonance imaging (MRI) has excellent spatial resolution in showing carpal tunnel and median nerve anatomy. However, MRI is not routinely used for screening patients with suspected CTS because it is time-consuming, expensive and may not be routinely available. Several studies have shown the diagnostic usefulness of the median nerve CSA in establishing a diagnosis of CTS. Interestingly we found that the difference in CSA of the median nerve in mild, moderate, and severe forms of CTS was not statistically significant in the tunnel inlet¹³. Hence USG measurement of CSA of median nerve was not at all correlated with disease severity.

Conclusion:

Sonography is an accurate technique for the evaluation of median nerve in patients of CTS with high sensitivity but low specificity. Therefore it can be used for screening large population of patients as it is simple, easily available, non-invasive test and has relatively low cost. Not only that but also ultrasound is useful in evaluating and excluding local causes of nerve compression like tenosynovitis, cyst. It is also good in identifying the anatomic variations in carpal tunnel. To establish the diagnostic accuracy of ultrasound in CTS, more studies are needed taking asymptomatic individuals as controls. Last but not the least sonography should be compared to NCS using a strictly defined gold standard clinical parameters and standardised examination techniques.

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Medical Philately



Country Swaziland; **Date** 1981; **Disability** Amputee; **Number** SG392
Theme Access|| World Health Organisation WHO

Pg Forum

REHAB CHALLENGES

A 68 years old female presented with severe low back pain and paraparesis for last two months. She also lost 3 kg weight during the same period. On examination we got lower motor type of weakness in L4, L5 distribution with intact bladder and bowel. Her x-ray lumbosacral spine (Fig 1) showed wedge compression and inflammatory markers were high (ESR 109 and CRP 42). Interestingly her chest x-ray (Fig 2) showed elevated right hemi diaphragm. USG of whole abdomen picked up heterogeneous mass 12×10.3cm and small satellite lesions limited to right lobe of liver. Mean while her MRI (Fig 3) picked up a right lower lobe consolidation and compression of cauda equina. So a final diagnosis of metastatic carcinoma with possible lung primary was made.

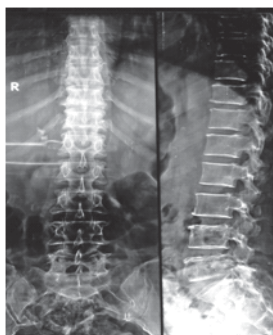


Fig 1



Fig 2

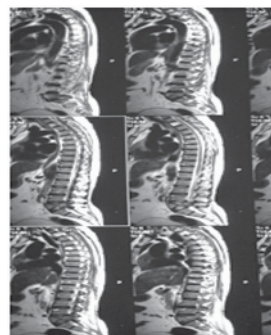


Fig 3

On conservative management with exercise schedule, spinal orthoses along with opiates her symptoms relieved little bit. The oncology team involved with active medical management. But still patient is quiet depressed and is in agony. She is desperate for ambulation as soon as possible.

Please opine regarding further rehabilitation plans for this patient.

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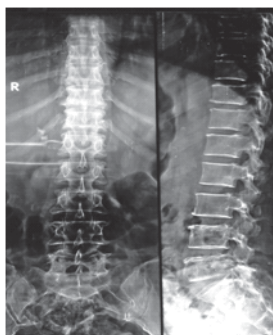


Fig 1



Fig 2

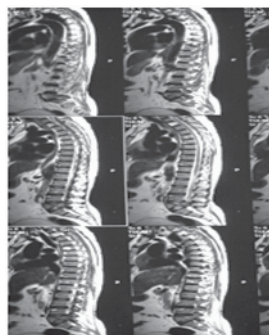


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Pictorial CME

Muscle Weakness in Prader Willi Syndrome

Pramanik R¹, T Ahmed²

A 15-year-old boy presented in PMR OPD with generalized obesity (BMI 29.2) (Fig 1) and muscle weakness since 2 years of age. He has history of hyperphagia since early days. On thorough assessment in indoor it was found that he had significant hypotonia and small hands and feet without any polydactyly or syndactyly (Fig 2). On inspection we noted high arch palate without almond shaped eyes, V shaped mouth, dysplastic ears, high nasal or flat nasal bridge ((Fig 3). He was suffering from nasal speech and clinical signs of hypogonadism ((Fig 4).

When we assessed IQ we found that he was suffering

from moderate mental retardation (IQ 30). His TSH, free T4, testosterone levels were 2.9, 1.19 and 10ng/dl respectively. Generalised obesity ruled out the diagnoses of Ahlstrom, Cohen and Carpenter syndrome. Presence of craniofacial abnormality, nasal speech, limb hypotonia and absence of polydactyly excluded the diagnoses of Laurence- Moon - Biedle syndrome. These clinical features clinched the diagnoses of Prader- Willi Syndrome.

We counselled his parents regarding the disease prognoses. Non-pharmacological therapy improved his muscle strength and gait pattern slightly.



Fig 1



Fig 2



Fig 3



Fig 4

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Cite as :

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Perspectives for PRM Development : An Italian Point of View

Alessandro Giustini

The challenges we must meet:

We all realise the great changes that have taken place in our perception of health, the conditions necessary for subjective wellbeing and for what we define as “quality of life”. Disorders, symptoms and phenomena that perhaps in the past were supported and considered inevitable are now no longer accepted and demands are rightly made for all treatments that can eliminate or alleviate such problems. This is causing an ever more rapid expansion in the duties and aims of Medicine, as the frontiers of the needs and requests of citizens enlarge. There is a parallel expansion in overall requests for services and performances, which are not limited only to the field of healthcare, but extend more generally to social policies. Of course, all this must be proportional to the real existence and potential of treatments, based on scientific evidence and not only on hopes and illusions.

Rehabilitation is the sector of Medicine that, more than any other, is in the centre of this transformation: demand is growing and there is a parallel growth in the scientific potential to modify disabilities that previously could not be treated with success.

The starting point of all rehabilitation activities and associated professional and organisational responsibilities is the right of the individual, in the face of whatever participation limitation and/or disability that alters even only transiently his autonomy, self-sufficiency

and self-determination to receive a diagnostic evaluation, a prognosis and, if possible, a treatment suitable for the problem related to his overall bio-psycho-social situation; these must be understandable and controllable by everyone. Social participation is a term that very well represents the person’s fulfilment of this set of activities and rights.

The individual’s right is inextricably bound to the duty of society to guarantee every person all the instruments suitable for maintaining, for as long as possible and at as high a level as possible, personal autonomy in participation in social tasks. It is also society’s duty to optimise and at the same time verify the appropriate use of the many available rehabilitative instruments with respect to parameters of efficacy, efficiency and sustainability. It is equally obvious and important that all the problems of the economic sustainability of services, in proportion to the evidence of their efficacy and suitability, must be approached with complete clarity of information. Such information, first of all for the choices in the general context of the population and in parallel for individual cases, is an essential element for building active and conscious involvement in the process of rehabilitation of the person, and of the community as far as is necessary.

We know that demands for health, treatments, restoration of autonomy and personal self-sufficiency are burgeoning and are being made by an ever broader group of people who, for numerous and extremely varied reasons, have found their state of well-being compromised. Research and clinical knowledge in our discipline offer ever greater possibilities of meeting these demands, with intrinsic, retraining and compensatory treatment methodologies and with therapeutic procedures that incorporate musculoskeletal, kinesiological, neuropsychological, motivational, and occupational resources and potentials, etc.

Everyone knows how it is important that each health system can have the necessary comprehensive management organisation for the instruments and

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resources used, in relation to their expected aims and achieved goals; it is equally important, given the rapid changes in demographic and socio-economic situations, that every welfare system can have instruments to make the necessary connection between these interventions and the related healthcare aspects.

After the UN Convention, more recently World Report on Disability - WRD was launched in New York by WHO – UN: it displays what has come to be known as the integrative model of functioning and disability as expressed in the International Classification of Functioning, Disability and Health (ICF) and underlines all the evidences in rehabilitation, in social, health, educational, work and cultural fields in any community and country.

WRD strongly acknowledges the genuine role of PRM and its contribution to enhancing a person's functioning and participation in life. Challenges lie in the delivery of rehabilitation services in underserved parts of the world, ranging from the provision of timely, cost efficient and effective treatment, and the involvement of people with disability, family and care-givers in the decision making process.

WRD assembles the best available scientific information on disability : the definition of a National Plan to apply all these points is suggested as the most important point for every Country.

THE ITALIAN POINT OF VIEW TO FACE THE PROBLEM: THE REHABILITATION PLAN 2011

In this framework, the purpose of the rehabilitation intervention is “to regain health”, no longer seeing the disabled person and his limitations in participation as a “patient”, but as a “person with rights” (Madrid Conference of 2002, European Year of the Disabled). The purpose of the rehabilitation intervention is therefore to define the “person” and then realise all of the health intervention necessary to provide him with assistance, with a view to actual empowerment, the condition of the highest possible level of functional efficiency and participation, in relation to the person's will and the context.

So we think that is necessary a sort of “integrated itinerary of assistance” for the overall reference that makes the health and non-health components of the rehabilitation intervention synergetic. In this ambit, the Individual Rehabilitation Plan (IRP) is the specific, synthetic and organic instrument for all of this, which is unique for each person, defined by the specialist

rehabilitation physician, in common with the other professional figures involved. Full information and aware and active participation in the choices and intervention on the part of the person who is at the centre of the process, his family and life context, are always essential elements.

The intervention determined by the IRP, centred on the various selected problems, requires systematic evaluation of performance and definition of the objectives and process indicators, in order to verify achievement of the expected results. Applying parameters of the impairment, limitation in activity, restrictions in social participation listed in ICF, the IRP defines the prognosis, expectations and priorities of the patient and his family; this is shared with the patient, when possible, with the family and care-givers, defining the characteristics of congruity and appropriateness of the various forms of intervention, as well as the conclusion in healthcare acceptance, in relation to the results achieved.

The Italian Plan defines 3 fundamental “cornerstones” to be able to manage such an holistic approach, and such a needed holistic service :

1. Degree of necessity of the person to be rehabilitated

In order to correctly define the level of need of the person to be rehabilitated, three dimensions can be identified, which permit placement of the person, when opportunely combined, independently of the main pathology that created the disability (whether cardiological, respiratory, neurological, metabolical, oncological, etc), in the most appropriate settings in relation to the phase of the itinerary of care, with the use of resources.

- 1.1 *Clinical complexity*: Assessment and stratification of high clinical risk. Clinical complexity is correlated to the set of diagnostic, welfare and organisational complexities and the different therapeutical interventions, proportionately graduated by complexity and for the consumption of resources.
- 1.2 *Disability*: Loss of functional capabilities within the ambit of physical, motor, cognitive and behavioural activities, which in the most current bio-psychic-social concept, have an impact on environmental factors, reducing the level of participation of the individual in daily life activities and relations.
- 1.3 *Multimorbidity*: A set of pathologies and conditions classified according to scales and graduated points. These comorbidities may be a mere list for a more

accurate prognostic stratification or active cofactors that influence the clinic, treatment and prognosis.

This all becomes more complex if the patient affected by multimorbidities is also affected by fragility due to advanced age. This concept must be held in high consideration in the specific and specialist approach to dedicate to the elderly person. The very knowledge of the concept of fragility in rehabilitation of geriatric patients must be the basis of the rehabilitation plan, because the fragile elderly person is affected by multimorbidity, subject to complex pharmaceutical treatments, frequently clinically unstable, sometimes incontinent, with nutritional problems, often affected by cognitive degradation or dementia, sarcopenia, osteoporosis, an increased risk of falls, etc. These specific clinical situations substantially increase the serious risk of loss or worsening of the patient's level of independence, especially in extremely long-lived persons. This picture considerably reduces the ability of the patient to fully adhere to rehabilitation programmes. The loss and worsening of autonomy are also related to social problems that reduce the support of the family network, further compromising the effectiveness of the rehabilitative intervention, especially where solitude and the loss of social integration are strongly present.

2. Different Health Conditions of Subjects

Nevertheless we must start rehabilitation as soon as possible, in the acute phase too, very often the chronic nature of health problems and time since their development can determine a deterioration of the organ function (and other problems) and increase the level of disability, through the alteration of the physiological function and frequent worsening. The consequent vicious cycle determines the worsening of the symptoms, reduced working ability, tolerance to effort, worsening of inactivity and disability, reduced social involvement and depression.

An additional characterisation of the level of need for rehabilitation must also be based on the characteristics of presentation and evolution of the pathology, which may be characterised by:

- Frequent worsening, hospitalisation (high risk person);
- persistence of a high level of clinical assistential complexity with a high level of absorption of resources and a requirement for a personalised and multidisciplinary approach (highly complex person);
- chronic disability outlook associated with a bad

lifestyle (use of tobacco, inactivity, hypercholesterolemia, overweight) where the intervention is concentrated above all on monitoring the evolution and on a process of education and modification of the subject's habits, in order to prevent the insurgency and advancement of the chronic pathology (person with chronic or serious pathology or serious factors of risk).

3. Rehabilitation : network interventions in the continuum

As a matter of fact only a real, coordinated and complete network can cover all these problems offering the right solution in the right moment and condition, applying the right resources, defining the right goals in relation to the different steps and times, guiding and involving the person and his/her family in the right run to reach the possible health.

In our Italian point of view to realise a real network the main tools are:

a) *Clinical governance*

Integrated clinical governance is a global approach to the management of health services, which makes the individual's need central. To do the right thing, at the right time, in the right place, is the synthesis of the concept of technical quality. To this end, methodologies and instruments are used, such as the guidelines and assistance profiles based on tests to determine effectiveness, the management of clinical risks, informative systems built up starting from the integrated (digital) clinical records, the valorisation of personnel and the relative training, regulatory and multi-professional integration, the systematic evaluation of performance of the process (output) in order to introduce appropriate innovations and ensure the involvement of all parties, the volunteer associations and the community.

The correct use of resources requires a clear and precise definition of the criteria for access to the rehabilitation, in order to offset cultural and organisational delays, through greater appropriateness. It is deemed necessary:

- For the procedure for acceptance to be activated for all persons who have a true necessity (criteria for "access" and "coverage of the network");
- for intervention to be performed in a suitable timeframe with respect to the type of need and in respect of intervention times, as a function of the biological phases of recovery and the socio-environmental needs (criterion of "timeliness");
- for there to be a guarantee of coherent succession

and integration of the various types of intervention and settings, depending on the phases of the morbidity, the clinical condition of the subject, family and environmental situations (criterion of “continuity”);

- for priority to be given to the all-inclusive acceptance of the disabled person and to ensure that mere single-specialist functional organ re-education services alone are not distributed (criterion of “appropriateness”);
- for every intervention to be performed on the basis of a rehabilitation programme, which must be developed by the professional involved and which must achieve specific, well defined and measurable objectives, included in the individual rehabilitation plan (criteria of “all-inclusive acceptance” and “measurability of effectiveness of intervention”);
- for intervention of recognised and shared validity be provided, with causal purposes that are more than symptomatic (criteria of “effectiveness” and “evidence based medicine”);
- to facilitate the patient’s and his family’s active and aware participation in the itinerary of care, which should be pursued, if necessary, with action to educate, support, train and inform, throughout the entire period of acceptance for rehabilitation (criterion of “active involvement of the user”);
- to favour an educational approach for the patient, in order to provide him with cognitive and operational instruments for proper self-management of his problems, with a view to dismissal from the medical facility (“suitable physical activity” and the criterion of “active involvement of the user”);
- for an independent, impartial and objective system of evaluation of the effectiveness and efficiency of the individual acceptance to be developed (criteria of “evaluation of effectiveness” and “evaluation of efficiency”).

Continuous training, the collection of data on the process and results, auditing and the adoption and continuous verification of shared procedures are the instruments for constant verification of the health services provided.

Communication, including external and internal communication, must be made a central element in actions for improvement. Transparency in the use of information is a signal of dependability, foreseeing the regular production and distribution of information in a systematic manner, relative to quality, safety, the activity and experience.

Furthermore it is necessary to guarantee the following within the ambit of health rehabilitation service: participation in programmes of primary prevention of illnesses that involve the risk of disability and in programmes of health education for the population;

- participation in the processes of diagnosis and care of illnesses that have a risk of creating disabilities, in order to contain the insurgence of secondary and tertiary damage, which can be prevalent in determining the degree of residual disability;
- prescription, selection and training in the use of prostheses, orthotics and aid for personal autonomy and the relative testing of the supplies provided, within the ambit of the official price list, and verification of the effectiveness and efficiency of the supply service;
- the offer of technical assistance for services to ensure professional qualification and requalification and for the social service for social and professional reintegration of persons with disabilities and the correlated problems;
- equipment designed to provide health rehabilitation intervention, which constitutes an actual, privileged interface between health intervention and the achievement of results, especially for more serious disabilities that are secondary to neurological damage.

b) *IRP - Individual Rehabilitation Plan*

Hospitalised disabled persons in the acute phase must be immediately provided with an integrated proposal for their individual rehabilitation plan, with the various therapeutical settings of the network of rehabilitation. This principle takes concrete form in the concept of “acceptance of the user” and in the distribution of intervention according to defined rehabilitation programmes, within the ambit of a specific individual rehabilitation plan (IRP), applying the concept of prescriptive and distributive appropriateness.

The decision-making process of the PRM physician (Director of the patient’s clinic) in determining the individual rehabilitation plan, must take into account the functional prognosis and the margin of modification of the disability outlook, the patient’s degree of clinical stability and his possible participation in the programme.

Physician responsible of the IRP guarantees a constant flow of information to the patient, family, caregivers and the family doctor, who are all involved in the IRP activity,

even through the involvement of professionals on the team. IRP contains and indicates:

- Areas of specific intervention, objectives, the professionals involved, the settings, the methodologies and methods of rehabilitation and the timing for realisation and verification of the intervention making up the rehabilitation plan are defined in the plan itself, which specifies:
- the manner of acceptance by a specific structure or professional, in respect of the criteria of accreditation;
- short and mid-term objectives to be achieved and timing to verify and close;
- procedures and timing for distribution of the individual services envisioned;
- appropriate measurement of expected results for evaluation of the intervention.

c) *The Rehabilitation Department:*

In consideration of the complexity of the itineraries of rehabilitative assistance and their necessary and coherent articulation within the ambit of diversified types of hospital, extra-hospital, territorial, health and social settings, it appears indispensable to have a departmental organisation of rehabilitation activities.

The department provides the guarantee of realisation of an appropriate itinerary of rehabilitation care for all persons who require it and is the actual hub of clinical governance; instruments must be provided to the Department of Rehabilitation to permit the achievement of objectives of clinical and organisational quality, in respect of the available resources; additionally, instruments must be conferred to manage safety, quality, the personnel training policy, audits, etc. To this end, the department guarantees strong organisational integration with accredited private facilities present in the territory, according to the principles of efficiency and appropriateness.

The priority commitment of department is to guarantee continuity between in-patients, and out-patients and home cares in any health conditions.

Rehabilitation department is the only tool to verify and offer to all disabled people in a specific area (in Italy about half a million of inhabitants) appropriateness and sustainability for any rehabilitation personal itineraries for treatments.

The rehabilitation itinerary entails the relative diagnosis; therefore in the definition of the rehabilitation settings,

it is deemed necessary to take the following elements into consideration:

- Definition of the type of pathology that determined the disabling damage and the classification according to the ICF categories;
- the level of acuteness or chronic nature of the disability, distinguished on the basis of the temporal parameter – namely, the interval of time since the insurgence of the acute state of the disabling illness;
- the level of complexity of the patient accepted;
- the number and type of programmes appropriated for the type of disabilities present, with particular reference to the problems of the population during the age of development, guaranteeing the necessary continuity in this sector in passing to the adult age;
- the instruments of evaluation and therapeutic instruments appropriated for every programme in relation to the recovery from the disability, with particular reference to cognitive and neuropsychological problems as well;
- the instrument of measurement/final evaluation of the objective(s) envisioned by the programme(s) of the individual rehabilitation plan.

d) *Definition of levels and places for care*

The proven effectiveness of the timeliness and rapidity of the rehabilitation intervention, documented by the evidence of literature in terms of recovery and prevention of further damages, requires the rehabilitation itinerary and the definition of the relative rehabilitation plan to be started up contextually with hospitalisation in the acute phase. The rehabilitation procedure is a criterion of appropriateness and must be valorised as an integral and unforgeable part of the price of the episode of hospitalisation in the acute phase.

1) *Intensive rehabilitation*

Rehabilitation in hospitalisation and care facilities, hospitals and accredited extra-hospital facilities, is characterised by rehabilitative health intervention designed to recover from important and complex disabilities, which can be modified and which require a high level of commitment in assistance, referable to nursing articulated over a period of 24 hours. These situations require contiguous management with the specialisations, instrumental and technological conferrals of the acute phase : so is possible to start very soon the rehabilitative interventions also for person in serious and critical condition, having a specialist multidisciplinary medical consultancy. The

objective of this intervention is further clinical stabilisation, with re-establishment of an independent condition and/or manageability in an extra-hospital environment. This Unit can be based in General Hospital or not, but maintaining all these conditions and characters.

Upon achievement of a condition of clinical stability that does not require medical presence 24 hours per day, or when high complexity diagnostic requirements cease to exist, it is opportune to resort to intensive extra-hospital rehabilitation. Management of the phase of dismissal and continuity in the departmental itinerary of rehabilitation require integration with the network of territorial services and close collaboration with the general practitioner. The treatment must be at least 3 hours per day, distributed by the physiatrist, rehabilitation health professionals and nursing personnel. Social worker and psychologist, where necessary, support the rehabilitation intervention and contribute to the definition and realisation of the plan for dismissal and reintegration within a congruous time frame.

All of the activities must be documented and recorded in the clinical rehabilitation records, which are an integral part of the Individual Rehabilitation Plan (IRP).

2) Highly specialised intensive rehabilitation

Highly specialised intensive rehabilitation activities require special commitment of qualifications, means, equipment and personnel, and are distributed within the ambit of the national territory as a network of services in the specific fields identified by the national health programme. These centres carry out also the following functions:

- The preparation of operational protocols for the acquisition of epidemiological data relative to the invalidating illnesses on the provincial and regional level;
- the promotion of clinical research and controlled experiences to favour new techniques of rehabilitation;
- professional training, specialisation and refreshment of operators;
- the offer of technical consultancy for the construction and experimentation of aids, prostheses and orthotics.

The highly specialised intensive rehabilitation guarantees, by more than 3 hours of rehabilitative interventions per day, dedicated itineraries :

- For person affected by SCI through dedicated structures for the acute phase and structures for the management of complications in the stabilised phase;
- for persons affected by acquired serious cerebral lesions and serious encephalic traumas; for persons affected by serious disabilities in the age of development;
- for persons with acquired neuropsychological disturbances;
- for persons suffering and strongly disabled for serious acute or cronical cardiological or respiratory pathologies.

3) Extensive rehabilitation

The activity of extensive rehabilitation is distributed within the ambit of hospital and extra-hospital environments, in a continuous or diurnal cycle residential regimen. It is characterised by health rehabilitation intervention:

- For patients who are not self-sufficient, with potential for functional recovery, who cannot benefit or sustain intensive rehabilitation treatment, requiring hospitalisation, because they are clinically unstable. Disabling conditions involving several organs in highly complex persons, as previously described, with complex clinical-assistential situations of complexity due to the comorbidity of concomitant pathologies that interact with the rehabilitation prognosis, also find an appropriate setting in this phase. These situations require contiguous management with the specialisations, instrumental and technological conferrals of the acute phase. The objective of the intervention is further clinical stabilisation, with re-establishment of an independent condition and/or manageability in an extra-hospital environment.

Normally the hospitalisation in Italian organisation must not be extended beyond 60 days. The rehabilitation intervention must be at least one hour per day.

e) *Activities in the community*

The rehabilitation network (and as explained department) finds natural continuity on the community level : the only context where it is possible to verify the actual outcome in terms of activity and participation. This ambit is therefore the privileged place for contextual intervention on the environmental components and on personal factors (ICF) even if these aspects must be yet evaluated and faced into the individual rehabilitation plan during the previous phases of cares.

In fact, for the real completion of the individual rehabilitation plan, it is necessary to continue in the community the rehabilitation intervention in order to achieve integration and social inclusion.

Intensive or extensive rehabilitation interventions may therefore be functional to achieve of the goal for the IRP, especially for specialist activities to integrate or reintegrate the patient in a working environment, scholastic integration, realising an independent life in the community.

Five can be the main key-points to build this part of the network:

1) Discharge from hospital

Coherently with the principle of “acceptance” and the need to guarantee a single integrated rehabilitation itinerary in the various therapeutic settings of the rehabilitation network to the disabled person with acute symptoms who has been hospitalised, the phases of passage between the various rehabilitation settings and, in particular, protected dismissal and “critical dismissals”, as well as the necessary continuity in rehabilitation intervention at the home or in assistance facilities (in connection with the general practitioners and paediatricians of free choice, as well as the territorial services), must be cared for and monitored within the ambit of the department, with suitable instruments of evaluation of the appropriateness.

2) Out-patients services

Within the ambit of the organisation of out patients/ ambulatory level, it is necessary to differentiate between two distinct types of users, defined on the basis of differentiated needs and levels of rehabilitation intervention, independently of the age segment of the population the subject belongs to:

- “Complex” case: users affected by important impairments and/or disabilities, often multiple in nature, with possible permanent results, a high degree of ADL disability requiring a multi-professional team (at least 3 types of professionals for rehabilitation, including the rehabilitation specialist physician) which performs an all-inclusive acceptance over the long term, through an individual rehabilitation plan that envisions multiple therapy programmes.

These rehabilitation activities, detailed in the IRP, are distributed in the form of complex ambulatory packages within rehabilitative departmental structures (day

Services or dedicated out-patients centres), with an overall duration of treatments of at least 90 minutes.

- “Non-complex case”: users affected by impairments and/or disabilities of any origin, which, on the basis of an IRP, require a single therapeutical programme for rehabilitation, distributed either directly by the rehabilitation specialist physician or through the IRP by a single type of rehabilitation professional; these users must be accepted for reduced periods of time; the duration of the access must be at least 30-45 minutes.

Access in both cases is granted to the ambulatory rehabilitation itineraries through an examination by a PRM physician, at the request of the general practitioner, who indicates the clinical problem(s) to be evaluated.

3) Home

Restoring the person to his own life environment is the most important objective of the rehabilitation itinerary, which all of the intervention programmed in the individual rehabilitation plan must tend to achieve.

The home treatment may, in this sense, constitute the continuation of the treatment realised in the previous phases, within the ambit of the IRP, representing the area of maximum collaboration with the general practitioner and paediatrician.

Such treatment can be distributed when envisioned by the IRP to cope with a rehabilitation need if the patient cannot gain access to ambulatory services.

The home environment is the privileged venue for intervention within the competence of the occupational therapist, for environmental adaptation and training for the use of aids and rehabilitation technologies.

4) Social Service and Health Facilities

For social service and health facilities older people can perform rehabilitation treatments in the community ambit as indicated by previous points (out-patients and home) in the department organisation and networking.

5) Physical exercise and disability

The National Italian Prevention Plan (2010) valorised the role of physical activity in promoting not only the well being of healthy people, but also its fundamental action in contrasting the chronic phase of the disability, thus representing a logical and physiological continuance of the rehabilitation.

In fact, the rehabilitation process, with its therapeutical intervention, plays an indispensable and irreplaceable

role as long as the patient is subject to possible active change in his level of functional efficiency; beyond this limit, however, it is necessary to consider the implementation of an appropriate lifestyle for the disabled person, analogously to what takes place for persons with chronic disturbances.

In chronic illnesses, a sedentary lifestyle becomes the minimum common problem that determines and accelerates the process of disability.

APA (Appropriate Physical Activity) plays various roles: reconditioning following rehabilitation, combating hypomobility, favouring socialisation, promoting a more correct lifestyle (prevention); it therefore appears to be a valid aid capable not only of interrupting this vicious circle, but also of creating a virtuous one.

APA is not rehabilitation activity, but maintenance and prevention, whose purpose is to facilitate the acquisition of lifestyles that are useful in maintaining the best possible level of autonomy and the quality of life.

APA, performed regularly, is capable of producing improvements in walking, resistance to physical effort, reducing difficulties in performing the activities of daily life necessary to guarantee autonomy in the home and out of the home; additionally, it favours and provides incentives for socialisation, improving the tone of humour, motivations, social and family relations.

Finally, the value of APA should not be forgotten in terms of education and training, through the active involvement of the subject in his own health plan and plan to gain independence, thanks to the promotion of regular activity and a more appropriate lifestyle.

The venues where APA is performed may be municipal gyms, protected facilities, associations, fitness centres, open spaces (cycling routes, life itineraries, etc), but which are not health facilities, in any case. The involvement of social services and volunteer associations, etc, is fundamental in structuring itineraries and in seeking dedicated venues.

Operators who direct these activities are not necessarily health professionals. It is indispensable for all of these operators to possess appropriate specific training on themes related to motor disability.

f) *Research in and for rehabilitation*

For many years, rehabilitative medicine suffered the consequences of the absence of scientifically valid and validated itineraries and instruments, making an empirical approach its *modus operandi* in assistance and

research. In the age of medicine based on evidence, this approach has created in the past a deep cultural and scientific divide between rehabilitation and other specialisations, which has begun to be eliminated only in recent years.

Research in rehabilitation has made great progress, availing itself of the methodological contributions of evidence-based medicine. Traditionally, the main scientific interest has been to study the physiopathological alterations and the recover of functions; more recently, a growing number of trials have been conducted, in a perspective of evaluating the effectiveness of rehabilitation in disabilities due to various pathologies. Meta-analyses are already available for some conditions, of controlled trials, from which important indications have been derived for the development of research, with the use of new technologies in rehabilitation, such as robotics, for example, virtual reality and tele-rehabilitation.

Research in rehabilitation, as WRD too well underlines, presents strong peculiarities that differentiate it from other disciplines; the outcome rehabilitation, for example, is difficult to measure using the traditional tools, as much as it tends to evaluate behaviour and not a single biological parameter. The team working methodology, the networking in different places and times, the multifactorial and often multipathology condition of person must be rightly evaluated in research design and in evaluations of results.

In this sense, research in rehabilitative medicine does not focus only on the organ damage, but on the reduction of the disability, which is obtained both through direct intervention on the function or structure, as well as through suitable strategies to reduce the limitations and restrictions in participation, obtained even and above all by addressing interaction between the person and his context, placing the person at the centre of action.

Hopefully, an interdisciplinary research activity with the objective of contributing to the following aspects will be implemented and promoted:

- Defining instruments of measurement according to the “International Classification of Functioning of the WHO”, which are essential in the construction of specific indicators for rehabilitation;
- identifying valid protocols of inclusion and reintroduction of the patient in his family and social environment;
- identifying strategies and methodologies of

evaluation of the adaptation and inclusion/reintroduction in the work or scholastic environment;

- developing new organisational models for the integration of the various resources (internal and external to the public and private health system), in order to guarantee efficiency within the system;
- identifying and validating criteria of appropriateness of the rehabilitation itineraries and indicators of effectiveness and efficiency of the process.

The facilities (universities, public or private hospitals and research centres) designated for rehabilitation research must possess competence and working methodologies capable of developing a level of in depth analysis, as well as clinical capabilities, also of integration with the overall network of care.

In evidence-based medicine research requires suitable facilities, including the facilities of the National Health Service, which, in addition to its assistance duties, also performs duties of clinical research; it also requires dedicated subjects, who know how to unite overall rehabilitation capabilities with the specific capabilities of research. It is also indispensable for everything to be connected with places of care in terms of “demand”, in order to orient research and translate the activities into clinical advantages to transfer, in a timely manner, to daily caregiving activities.

Moreover, given the fact that rehabilitation intervention aims to involve the entire person in his globality, the evaluation of indicators of the outcome is particularly difficult. This situation is further aggravated by the complexity of every individual case, which makes it problematic to apply methodologies of research that are normally used in other disciplines; this has given rise to the possible use of the “case by case, or single-case” methodology, providing the scientific method used.

It has therefore become essential to enhance “research capabilities” in rehabilitation, understood as the process of individual and institutional development leading to a higher level of knowledge and greater ability in conducting profitable research.

For example in these years in Italy (not only obviously) the field of “Telerehabilitation” is positively discussed to be one of the most important future tool to support the development of rehabilitation global intervention in this perspective of “individual, continuous and suitable” care, and in the same time sustainable in a financial

point of view too, with the potential benefits combining different interventions and different settings, reducing the cost of therapy connected up to home if necessary.

It is very important for research, and to improve evidence, to expand this kind of distance-rehabilitation in which accessibility, autonomous involvement, facility are merged to financial sustainability. This kind of new management can be easily connected with new technologies, robotic, virtual reality to enrich treatments and interventions, and seems to be a very decisive instrument for the solution as :

- Empowerment for learning, training and autonomous activity in functional recovery;
- overcoming of breaking up in recover between hospital discharge and home;
- monitoring of quality and contents of treatments, guaranteeing patients and families not only during the stay in hospital.

This kind of new approach could be very important immediately in many big fields: for example stroke or brain injury rehabilitation, or chronic musculoskeletal problems, pain, movement disorders, cognitive problems and many others.

Conclusions:

Our national experiences in the last 50 years in rehabilitation, together international indications in scientific evidences, together international documents also regarding disabled people rights reach a similar fundamental point : clearly many challenges, ethical, political, scientific, technical and economic can be positively overcome realising a real PRM network to diffuse rehabilitation interventions, to guide all activities, to govern every decision and programme, to be able to make a global and unified evaluation on results .

Toward the goal of providing a continuum of care in a multiplayer (medical, social, community, public services and accredited private ones) environment the only way is to coordinate and involve every other “agencies” in the community, needed to be active part for the positive rehabilitation global care for the person. A continuum delivered in the community mixing as necessary medical interventions together other activities towards participation and health.

This conclusion seems to be surely necessary for the future of rehabilitation, and for assuring rights for disabled people as necessary, but surely it is very complex and heavy to build and to maintain.

Must be a network (a large multiprofessional and multi-seat department involving immediately after acute problems including hospitals, rehabilitation centres and facilities, nursing homes and other residences, but in the same times many social activities and services, interventions in schools, every work-places, means of transport and mobility, many different associations of volunteers, of disabled people and families) ready to work into every aspect of the community, directly in relation to stakeholders and policy makers, ready to suggest programmes, to guide them and to be responsible on efficacy of results and of funds received.

Actually aiming to support and to develop these possibilities, we must try for example :

- To modify the education for PRM doctors (and for other professionals as necessary) to cover new responsibilities and tasks in the future networking together community and every other stakeholders, agencies and public/private subjects (methodologies, tools, quality measures, languages and contents, economical aspects).

- To implement researches in this perspective, modifying when necessary actual rehabilitation guidelines and protocols, creating some new protocols to apply to this continuous networking process .
- To implement researches in the field of new technical aids and new technologies able to support this evolution of rehabilitation.

Only by this way we can apply the lines of ICF and of all the international documents regarding rights of people; but in the same way we can strongly enrich our responsibilities and competences in scientific and professional fields.

In Italy we hope that our National Plan for Rehabilitation can be a positive step in this way, creating a sort of global and comprehensive network to “gain health” and in the same time a positive support for the international exchange of experiences and suggestions to reach all together a better level for our activities all over the World.

43rd IAPMRCON

At Hotel Mascot, Trivandrum, Kerala

On Jan 30th, 31st and Feb 1st 2015

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Dr. Roy R Chandran

TREASURER:

Dr. P. Selvan

SCIENTIFIC COMMITTEE CHAIRMAN:

Dr. Surendran A (09847061930)

REHAB QUIZ

1. **Illiocostal friction syndrome is seen in**
 - A) Multiple myeloma
 - B) Severe osteoporosis
 - C) Spondyloarthropathy
 - D) Scoliosis
2. **All of the following muscles have their peak of action shortly after heel-strike except the**
 - A) Quadriceps
 - B) Hip abductors
 - C) Hip adductors
 - D) Gluteus maximus
3. **The sural nerve action potential may be picked up on the skin over**
 - A) The medial dorsum of foot
 - B) The anterior lower leg
 - C) The area posterior to medial malleolus
 - D) The area posterior to lateral malleolus
4. **In a spastic hemiplegic patient wearing an ankle-foot orthoses, set in dorsiflexion to prevent foot drop, excess dorsiflexion will**
 - A) Increase knee stability at heel strike
 - B) Decrease knee stability at heel strike
 - C) Have no effect
 - D) Cause genu recurvatum
5. **Oxygen debt in the COPD patient may be caused by one or all of the following except**
 - A) Inadequate gas exchange
 - B) Maintaining the bent forward, kyphotic position
 - C) Loss of tone of abdominal muscles
 - D) Increased elasticity of lung tissues
6. **Tilting of the pelvis occurs maximally**
 - A) At mid stance
 - B) At push off
 - C) During swing through
 - D) At heel strike
7. **Which of the following are indications for sacrificing the knee joint in a lower extremity amputation?**
 - A) Diabetic neuropathy
 - B) Arterial occlusion with successful femoral popliteal bypass
 - C) Arterial occlusion with unsuccessful femoral popliteal bypass
 - D) Severe arthritis of knee
8. **Subcutaneous calcification may occur in**
 - A) Psoriatic arthritis
 - B) Dermatomyositis
 - C) SLE
 - D) Rheumatoid arthritis
9. **Cutaneous tumors, cafe au lait spots are suggest the diagnoses of**
 - A) Sturge Weber disease
 - B) Tuberous sclerosis
 - C) Tuberculosis
 - D) Von Recklinghausen's disease
10. **Arthrogryposis multiplex congenita is characterised by all except**
 - A) Decreased muscle bulk
 - B) Flexion contractures of wrist
 - C) Sclerodactyly
 - D) Internal rotation the arms and hands

ANSWERS**Answer of March 2014:**

1D, 2C, 3A, 4D, 5C, 6B, 7C, 8D, 9B, 10C

Case Report

Richie Cannieu Anastomosis: A Case Report

Sreejith K¹, Sudhil TR², Krishnaprasad IN³, Sreedevi Menon P⁴

Abstract

To perform or interpret an electrodiagnostic study, one should have a thorough knowledge about the normal human anatomy. Along with that, one should keep in mind the possibility of various anastomoses which can occur between different nerves. Richie Cannieu anastomosis is an anomalous ulnar to median communication in the palm between the deep branch of the ulnar nerve and the recurrent branch of the median nerve. Such an anastomosis in a setting of median or ulnar nerve injury can produce confusing clinical and electrodiagnostic findings. Correct diagnosis is important especially before planning any surgical intervention. Here we report a case of Richie Cannieu anastomosis to highlight the importance of knowing about such anastomoses.

Key words: Richie Cannieu anastomosis, electrodiagnosis.

Introduction:

Richie Cannieu anastomosis is an anomalous ulnar to median communication in the palm between the deep branch of the ulnar nerve and the recurrent branch of the median nerve. This anastomosis was first described by Richie (1897) and Cannieu (1897).

There are three types described:

1. All hand muscles innervated by the ulnar nerve (all-ulnar hand)
2. Motor innervation dominantly by the ulnar nerve
3. Some median innervated muscles innervated by the ulnar nerve.

Case Report:

A 43 years old male manual labourer with acute onset of right- sided foot drop was referred to our department for

electrodiagnostic studies. We did a clinical evaluation initially which revealed a right sided foot drop and sensory impairment in the right L4, L5 dermatomes. No other positive findings were found. Deep tendon reflexes were normally present in all the four limbs, the plantar reflexes were flexor bilaterally, the other limb was normal. No sensory or motor deficits were observed in the upper limbs. The routine investigations were within normal limits.

The patient was posted for an electrodiagnostic study for evaluation of foot drop. The nerve conduction studies (NCS) and needle electromyography (EMG) was performed using standard techniques under ideal conditions. During this procedure, we did the usual screening of the upper limbs. We encountered some interesting findings which prompted further electrodiagnostic evaluation. While stimulating the median nerve at the wrist and recording from the abductor pollicis brevis (APB), we got a low amplitude bifid compound muscle action potential (CMAP) (Figs 1&2). On stimulation of the median nerve at the elbow, a similar small amplitude bifid CMAP was obtained. Hence a Martin Gruber anastomosis was ruled out. Since the patient had normal strength of the APB and no wasting, we stimulated the ulnar nerve and recorded from the APB which surprisingly showed a CMAP just like that usually obtained when the median nerve is stimulated and recording is done from the APB. On stimulating the ulnar nerve and recording from the abductor digiti minimi (ADM), we obtained a CMAP of normal amplitude and latency. On stimulating the median nerve and recording

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from the ADM, no wave forms were obtained. These findings were obtained bilaterally. Needle EMGs of bilateral APB (Fig 3) and ADM (Fig 4) were normal. The sensory nerve action potentials (SNAP) from median, ulnar and radial nerves of both upper limbs were normal. These findings point to a rare anastomosis of ulnar to median nerves in both hands namely Richie Cannieu anastomosis. NCS of the lower limbs showed normal sural sensory conduction and reduced amplitude of CMAP recorded from the extensor digitorum brevis

and the adductor hallucis which pointed to a pre-ganglionic lesion. An MRI showed L4 /L5 disc prolapse.

Discussion:

Studies show varying data regarding the incidence of Richie Cannieu anastomosis. Budak *et al*¹ did not find any in 216 hands while Sarikcioglu and Sindel² found it in 1 out of 32 hands, Cannieu³ in 3 out of 20 hands, Harness and Sekeles⁴ in 27 out of 35 hands (77%) and Homma and Sakai⁵ in 4 out of 6 hands (66.6%).

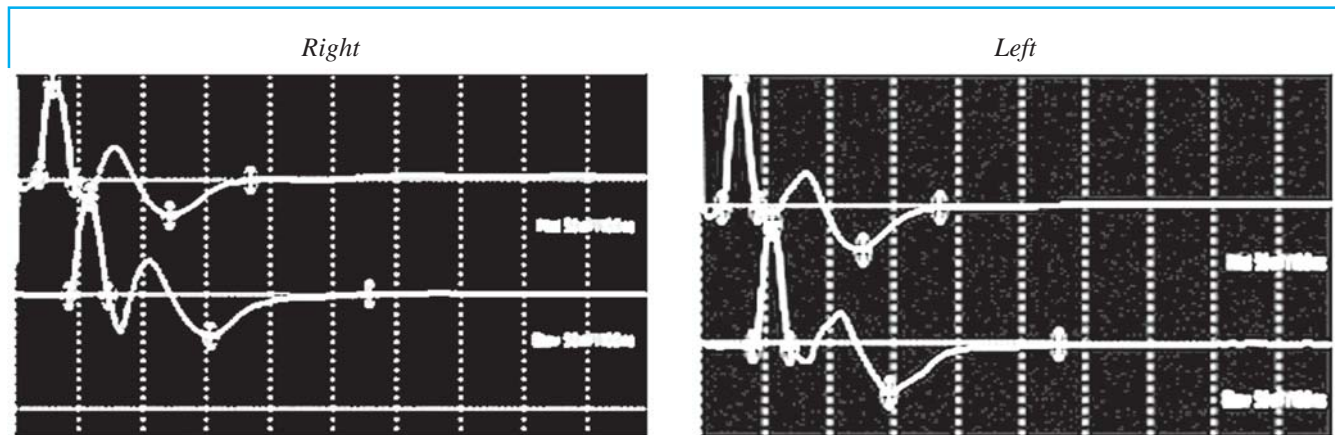


Fig 1- Median CMAP

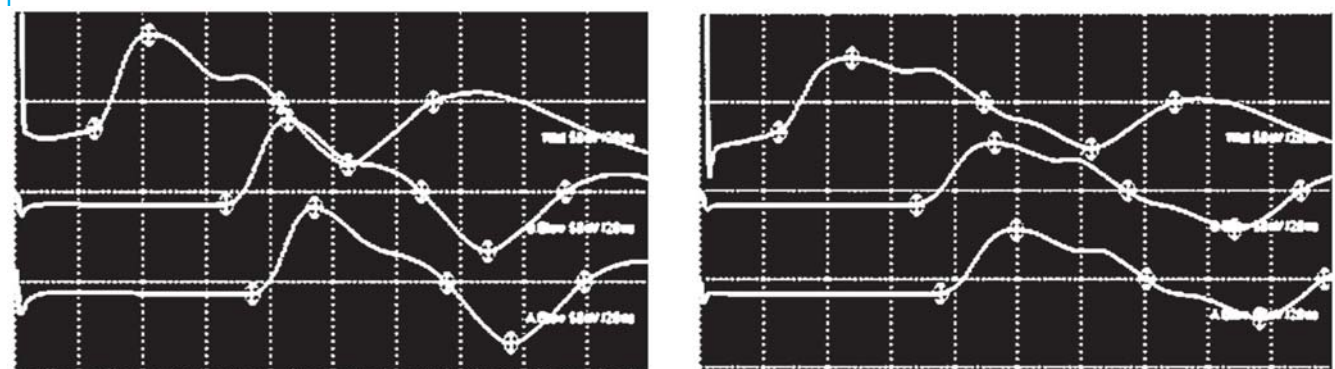


Fig 2- Ulnar CMAP

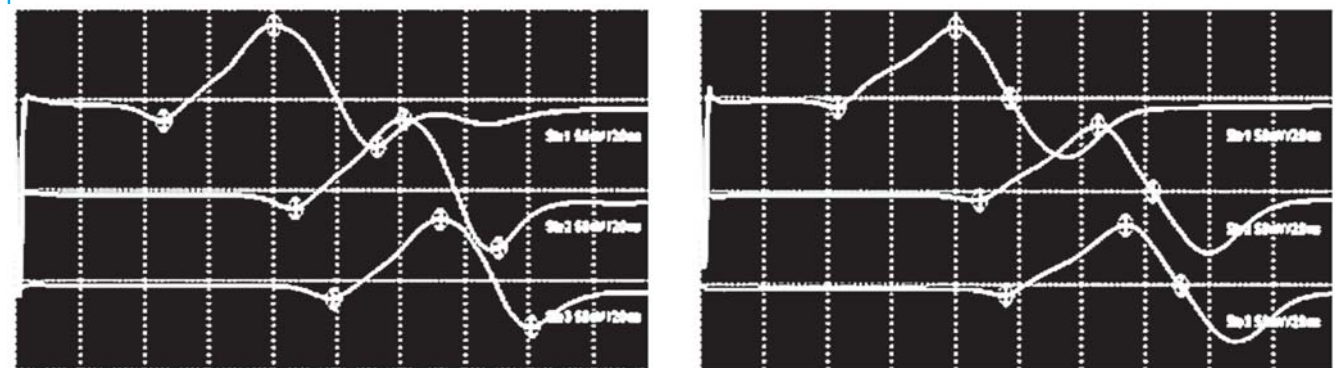


Fig 3- Ulnar Nerve Stimulation and Recording from APB

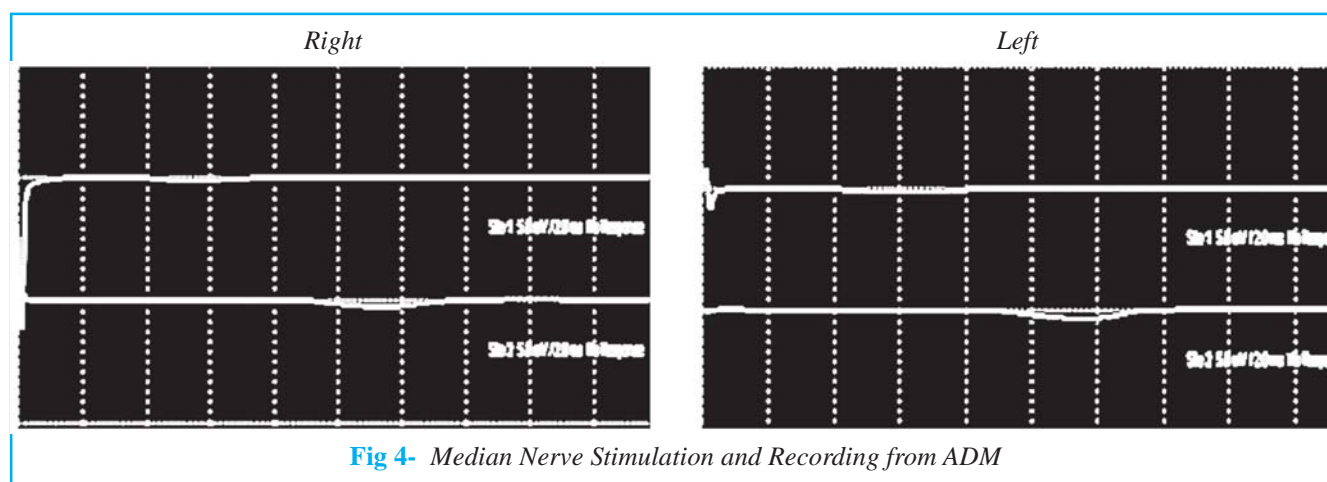


Fig 4- Median Nerve Stimulation and Recording from ADM

The knowledge about Richie Cannieu anastomosis is very important while doing an electrodiagnostic study. Otherwise there is a high chance for misdiagnoses. There is a case report by Saperstein and King⁶ about coexistence of a deep branch ulnar neuropathy and Richie Cannieu anastomosis wrongly diagnosed as motor neuron disease. Tamagawa *et al*⁷ reported a case of bilateral carpal tunnel syndrome in which there was a paradoxical preservation of the left abductor pollicis brevis muscle which was proven to be due to Richie Cannieu anastomosis. Refaian *et al*⁸ reported 2 cases of bilateral carpal tunnel syndrome in which the patients had significant preservation of function and minimal thenar muscle atrophy despite complete absence of a median CMAP. Sahcs *et al*⁹ reported two cases with nearly exclusive ulnar innervation of thenar muscles because of the presence of palmar communication between the ulnar and median nerve. Dumitru *et al*¹⁰ reported a case of ulnar neuropathy at the elbow with partial paralysis of the Abductor Pollicis Brevis. It is mentioned by Kline *et al*¹¹ about the erroneous diagnosis regarding the median nerve function after injury at the wrist which is presumably occurring in approximately one-third of cases. Boland *et al*¹² suggested an autosomal dominant inheritance for this anastomosis. Such an anastomosis in a setting of median or ulnar nerve injury can produce confusing clinical and electrodiagnostic findings. Correct diagnosis is thus important especially before planning any surgical intervention.

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