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Editorial

World Health Day 7th April, 2017

Depression: Let's Talk

World Health Day, celebrated on 7 April every year to mark the anniversary of the founding of WHO, provides us with a unique opportunity to mobilize action around a specific health topic of concern to people all over the world.

This year the topic of World Health Day campaign is depression. Mental health is integral to our well-being and as important as being physically healthy. The growing incidence of mental health issues is a reflection of the reality that confronts us today. Globally, around 350 million people of all ages suffer from depression, an increase of more than 18% between 2005 and 2015. Increased investment is also needed. In many countries, there is no, or very little, support available for people with mental health disorders. On average, just 3% of government health budgets is invested in mental health.

Lack of support for people with mental disorders, coupled with a fear of stigma; prevent many from accessing the treatment they need to live healthy, productive live. This condition affects people of all ages, from all walks of life, in all countries. It impacts on people's ability to carry out everyday tasks, with consequences for families, friends, and even communities, workplaces, and health care systems. At worst, depression can lead to self-inflicted injury and suicide, now the second leading cause of death among 15-29-year olds. Close to 800 000 people die due to suicide every year. Yet, depression can be prevented and treated. A better understanding of will help reduce the stigma associated with the illness, and lead to more people seeking help.[20]

Depression can be linked with other non-communicable disorders and diseases. Depression increases the risk of substance use disorders and diseases such as diabetes and heart disease; the opposite is also true, meaning that people with these other conditions have a higher risk of depression.

Depression is a common mental illness characterized by persistent sadness and a loss of interest in activities that people normally enjoy, accompanied by an inability to carry out daily activities, for 14 days or longer. They may also have loss of energy; a change in appetite; sleeping more or less; anxiety; reduced concentration; indecisiveness; restlessness; feelings of worthlessness, guilt, or hopelessness; and thoughts of self-harm or suicide.

Depression results from a complex interaction of social, psychological and biological factors. People who have gone through adverse life events (unemployment, bereavement, psychological trauma) are more likely to develop depression. Depression can, in turn, lead to more stress and dysfunction and worsen the affected person's life situation and depression itself.

Prevention programmes have been shown to reduce depression. Community approaches to prevent depression enhance a pattern of positive thinking. Also Interventions for parents and caregivers reduces depressive symptoms in them and improve overall outcomes. Exercise programmes for the elderly can also be effective in depression prevention.

There are effective treatments for moderate and severe depression. Health-care providers may offer psychological treatments (such as behavioral activation, cognitive behavioral therapy [CBT], and interpersonal psychotherapy [IPT]) or antidepressant medication (such as selective serotonin reuptake inhibitors [SSRIs] and tricyclic antidepressants [TCAs]). Health-care providers should keep in mind the possible adverse effects associated with antidepressant medication, the ability to deliver either intervention (in terms of expertise, and/or treatment

availability), and individual preferences. Different psychological treatment formats for consideration include individual and/or group face-to-face psychological treatments delivered by professionals and supervised lay therapists.

Depression can affect anyone, whatever might be the age, sex, or social status. Special attention to groups that are disproportionally affected: people with different disabilities and handicap, their caregivers, adolescents and young adults, women of childbearing age (particularly following childbirth), and older adults (over 60s) is very important.

Overarching Messages

- Depression is a common mental disorder that affects people of all ages, from all walks of life, in all countries.
- The risk of becoming depressed is increased by poverty, unemployment, life events such as the death of a loved one or a relationship break-up, physical illness and problems caused by alcohol and drug use.
- Untreated depression can prevent people from working and participating in family and community life.
- Depression can be effectively prevented and treated. Treatment usually involves either a talking therapy or antidepressant medication or a combination of these.
- Overcoming the stigma often associated with depression will lead to more people getting help.
- Talking with people you trust can be a first step towards recovery from depression.

R N Haldar **V Ghosal**

Special Editorial

On behalf of outgoing Editorial Board, I welcome and congratulate the new Editorial Board.

We are glad to hand over the charges on 1st. April 2017, honoring the constitution.

Last six years the Editorial Board has published regular 4 issues and 1 special issue in every year in colors. Process of indexing started but not yet succeeded. Hope the new board will fulfill our dream. Board has not taken any money from IAPMR for last six years as promised.

I like to thanks the commercial houses for minimizing the burden. I would like to convey my gratitude and thanks to all my board members, IAPMR members, printing houses and other helping concerns.

My special thanks to Dr Rajesh Pramanik and Dr Vasundhara Ghosal for their untiring effort for IJPMR.

So, I am the happiest man as the Editorship is transferred to most competent Dr. Rajesh Pramanik.

I will never say good bye till my activity stops with my last breath. Now I am also a vital member of Editorial Board.

Again my good wishes are with the new Editorial Board and see them successful.

I am grateful to you for making me National President of IAPMR 2017-2019 unopposed and seek your blessings and co-operations.

Jai Hind,

Long live IAPMR

Long live IJPMR

R N Haldar

Editor, IJPMR

Original Article

Effectiveness of Intra-articular Platelet Rich Plasma in Osteo-arthritis Knee

Puneet Nauwal[1], Mahima Agrawal[2], Mrinal Joshi[3]

Abstract

Objectives: To assess the effectiveness of intra-articular injection of autologous platelet rich plasma (PRP) on functional outcome in osteo-arthritis knee.

Study design: Prospective case control study.

Materials and Methods: A total of 113 individuals were recruited from outpatient door of Rehabilitation Research Centre, SMS Hospital, Jaipur. Out of which 59 individuals were kept in control group while 54 were taken in PRP group. Three PRP injections at a gap of fourteen days were applied to the affected knees in PRP group. Each individual was followed up to six months. WOMAC questionnaire was used as a functional outcome measure and pain was rated on numeric rating scale (NRS).

Results: There were a total of 113 individuals out of which forty-seven (41.6%) were male and sixty-six (58.4%) were female. On application of Mann-Whitney rank sum test on WOMAC between PRP group and Control group, there was no statistically significant difference ($p = 0.172$) at baseline. Up to 1 month the difference increased, but not statistically significant (p-value 0.068). At 3 and 6 months follow up, this difference became statistically significant (p- value 0.023) and (p-value <0.001) respectively.

Conclusions: Platelet rich plasma injections seem to be a promising alternative in the treatment and modification of disease course of osteo-arthritis. Though, further research and evidence is required to authenticate this statement.

Key words: **Platelet rich plasma, osteo-arthritis, WOMAC.**

Introduction:

Osteo-arthritis has a prevalence of 22–39 % in India, accounting for 30% of all joint disorders. It ranks among the top ten causes of disability worldwide and has a major impact on functioning and independence of a person[1].With the aging population, prevalence of osteo-arthritis is continuously on an increase.

Aetiology is multifactorial and includes both generalised constitutional factors (for example, aging, sex, obesity, heredity, reproductive variables) as well as local mechanical factors (for example, trauma, occupational and recreational micro trauma, misalignment, etc)[2,3].

Hyaline cartilage has limited intrinsic healing potential because it is avascular and has few specialised cells with a low mitotic activity. Once cartilage is injured, it gradually degenerates, leading to osteo-arthritis. None of the natural healing process is available for cartilage repair.

There is no curative treatment for osteo-arthritis. Several supportive treatments, both conservative and surgical, have been proposed to address cartilage pathology, but results are often only partially satisfactory and limited over time. Non-steroidal anti-inflammatory drugs have been the main pharmacological treatment, but have a high potential for side-effects on long term basis. Others like neutraceutical drugs have not been proven to be clearly effective [4].

Intra-articular injections of corticosteroids provide short-term relief in pain but do not change the natural history of the disease and may also have negative consequences. Intra-articular injections of hyaluronic acid produce an extended symptomatic improvement in patients with osteo-arthritis and can serve as an

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alternative to treatment with non-steroidal anti-inflammatory drugs and/or cortisone-based compounds. A relatively latest option is intra-articular platelet rich plasma injections[5].

Platelet rich plasma is defined as the plasma fraction with a platelet concentration greater than 2,00,000 platelets/µl). In recent years, autologous plasma rich in growth factors has been considered as a regenerative treatment for chondral tissue and a potential biological tool to treat soft tissue lesion. Presently, it is increasingly being used by pain physicians for the treatment of tendinopathy, acute and chronic ligament injuries,etc[6].The rationale for the use of platelet rich plasma is to stimulate the natural healing cascade and tissue regeneration by a "supra physiologic" release of platelet-derived factors directly at the site of treatment.

Activated platelets release growth factors contained in their α-granules. In this way, the plasma becomes a vehicle of growth factors such as transforming growth factor beta (TGF-ß), platelet derived growth factor (PDGF), epidermal growth factor (EGF) and vascular endothelial growth factor (VEGF)[7]. These growth factors are known to induce biological changes in cell proliferation, regulating bone cell metabolism, stimulating the replication of stem cells and bone progenitor cells and promoting angiogenesis, epithelialisation and formation of granulation tissue; furthermore, they influence the activity of collagen, promoting endothelial and fibroblast proliferation in connective tissue. After PRP, the mechanical behaviour of full-thickness chondral injuries is similar to that of immature healthy articular cartilage[8]. Despite the promising preclinical findings and the huge interest in its clinical application, many questions on PRP applicability and efficacy remain unanswered.

This study intends to show that intra-articular injection of PRP in osteo-arthritis knee can improve patient's quality of life and functional capacity.

Materials and Methods:

The present study was conducted in the department of Physical Medicine and Rehabilitation, Sawai Man Singh Hospital, Jaipur, during the period of April 2012 to December 2013.

Inclusion Criteria:

Individuals with age greater than 45 years, clinical and radiological diagnosis of osteo-arthritis, pain duration greater than 6 months and those who gave informed consent were included in the study.

Exclusion Criteria:

Diagnosed cases of polyarticular inflammatory arthropathies, intra-articular injections within last 6 months, infection at injection site, platelet count <105x109/l were excluded from the study.

Evaluation:

Each individual underwent complete musculoskeletal examination in the outdoor setting of Rehabilitation Research Centre, SMS Hospital, Jaipur. Individuals willing for PRP treatment were included in the study group and similar matched patients who refused PRP treatment in control group.

Intervention:

In the study group, blood collection was done under aseptic precautions using 3 acid-citrate-dextrose containing Vacutainer tubes of 8.5ml capacity. Samples were taken to stem cell lab in sterile box. Tubes were centrifuged at 1800 rpm for 8 minutes under temperature control conditions, after which blood got separated in three fractions. PRP was obtained by pipetting the middle fraction under a laminar flow hood. It was injected in affected knee by a PMR specialist through lateral approach using aseptic precautions.

Three PRP injections were done at 2 weeks intervals for each knee. Pain killers were prescribed on basis of requirement and number was monitored at each visit. In control group, patients were on varied medications as prescribed by their respective physicians or were taken as over the counter medication.

Follow-up:

Assessment of patient's status on numeric rating scale, WOMAC index and amount of drug consumption were made at 15 days, 1 month, 3 months and 6 months from first injection.

Independent Variables:

The following baseline information was recorded in all patients: age, sex, weight, body mass index, current work status, education level, occupation, duration of pain, knee range of motion, thigh girth, associated illness, crepitations, blood investigations including complete blood count and ESR, radiographic stage on Kellgren and Lawrence classification, numeric rating scale at admission, WOMAC index at admission, number of pain killers consumed per week.

Outcome Variables:

Numeric rating scale was used to measure the effect on pain in both groups. It measures the intensity of pain. Score on this scale is between 0 (no pain) to 10 (worst pain)[9].

WOMAC index was used to measure combined score of pain, stiffness and function disability in both the groups. Each question has been given a score of 0 for none, 1 for mild, 2 for moderate, 3 for severe and 4 for very severe problem. WOMAC index has three subscales. (1) Pain that includes five questions, scores of which range between 0 (best) and 20 (worst). (2) Stiffness that includes two questions, scores of which range between 0 (best) and 8 (worst). (3) Functional disability includes seventeen questions, scores of which range between 0 (best) and 68 (worst). Total WOMAC score may vary from 0 to 96[10,11].

Statistical Analysis:

All individuals were divided into two groups and were analysed at admission, at 15 days, at 1 month, at 3 months and at 6 months from first visit on all scales as mentioned previously. Comparison between mean values of each scale from admission to each follow -up was done by using Wilcoxon signed rank test. Comparison between mean values of each scale in PRP and control group was done by using Mann-Whitney rank sum test. Comparison of dose of paracetamol in PRP group and control group from admission to each follow-up was done using Paired t-test.

Approval by Ethical Committee:

This study was approved by the research ethical committee of SMS Hospital and is in accordance with the declaration of the World Medical Association.

Results & Analysis:

A total of one hundred and thirteen individuals were recruited for the study out of which fifty-nine were in the control group and fifty-four were in the PRP group. We had a complete follow-up of all individuals up to 6 months.

Demographics:

There were a total of 113 individuals out of which forty -seven (41.6%) were males and sixty-six (58.4%) were females. Of these 77 (68.1%) were in the age group of 45-65 years and 36 (31.8%) were in the age group of 65-85 years. Only 6 (5.3%) individuals had a body mass index (BMI) of < 20kg/m2, 71 (62.8%) had a BMI of 20-30 kg/m2 and 36 (31.9%) had a BMI of > 30kg/ m2. Duration of arthralgia was < 1 year in 15 (13.3%) individuals, 1-5 years in 43 (38.05%) individuals and >5 years in 55 (48.7%) individuals. In the control group, 2 (1.69%) knees were in grade I osteo-arthritis, 45 (38.14%) had grade II, 46 (38.98%) had grade III and 25 (21.19%) had grade IV OA, while in PRP group none of the individuals with grade I OA gave consent for intervention, 27 (28.13%) knees had grade II, 39 (40.62%) had grade III and 30 (31.25%) knees had grade IV OA. In the control group 30 (50.85%) individuals were involved actively in their work while 29 (49.15%) were not involved in active life. In the PRP group, 27 (50%) individuals were active workers while 27 (50%) were not.

Clinical Symptom Distribution:

As on NRS, 2 (3.39%) individuals had pain in the range of 0-5, 12 (20.34%) in the range of 6-10, 31 (52.54%) in the range of 11-15 and 14 (23.73%) in the range of 16-20. In the PRP group, 7 (12.96%) individuals had pain in the range of 6-10, 29 (53.70%) in the range of 11-15 and 18 (33.33%) in the range of 16-20 (Fig 1).

According to WOMAC score, in control group, 3

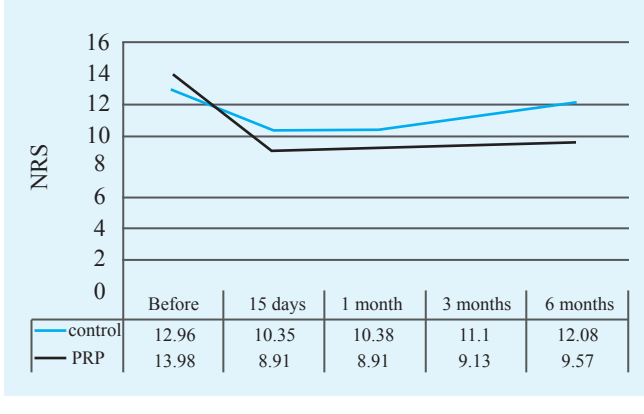

Fig 1- Comparison between PRP Group and Control Group on Numeric Rating Scale

(5.08%) had a score of 1-24, 14 (23.73%) had a score of 25-48, 29 (49.15%) had a score of 49-72 and 13 (22.03%) had a score of 73-96. In the PRP group, 2 (3.70%) had a score of 1-24, 9 (16.67%) had a score of 25-48, 27 (50%) had a score of 49-72 and 16 (29.63%) scored 73-96. More than 80% patients reported moderate to severe stiffness in their knees (Fig 2).

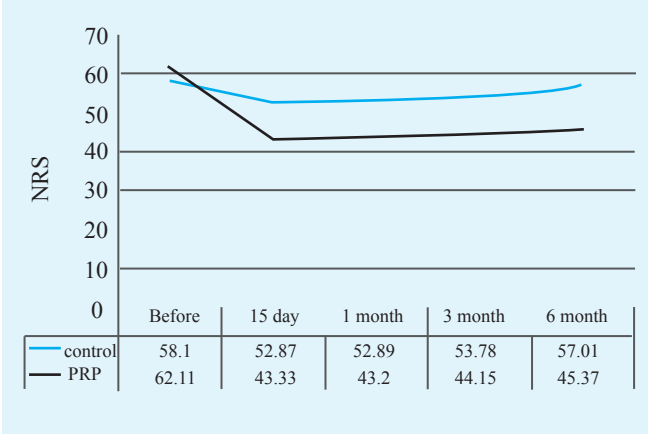

Fig 2- Comparison between PRP Group and Control Group on WOMAC Index

On application of Mann-Whitney rank sum test on WOMAC between PRP group and Control group, there was no statistically significant difference (p = 0.172) at baseline. Up to 1 month the difference increased, but was not statistically significant (p-value 0.068). At 3 and 6 months follow-up, this difference became statistically significant (p-value 0.023 and p-value <0.001 respectively).

Mean scores on pain and stiffness subscale of WOMAC index are given in Tables 1 and 2 respectively.

Comparison of mean scores of function in WOMAC between the two groups is given in Table 3.

Table 1: *Comparison between PRP Group and Control Group on Pain Subscale of WOMAC Index*

	Group	No of cases	Mean	Sd	P - value
Before	PRP	54	12.69	3.53	0.158
	Control	59	11.78	4.3	
15 days	PRP	54	8.04	3.45	0.026
	Control	59	9.85	3.63	
1 month	PRP	54	8	4.27	0.025
	Control	59	9.85	3.64	
3 months	PRP	54	7.98	4.11	0.009
	Control	59	10.07	3.68	
6 months	PRP	54	8.37	4.19	0.001
	Control	59	10.97	3.25	

Table 2: *Comparison between PRP Group and Control Group on Stiffness Subscale of WOMAC Index*

	Group	No of cases	Mean	Sd	P - value
Before	PRP	54	4.09	1.74	0.426
	Control	59	3.83	1.73	
15 days	PRP	54	2.93	1.9	0.125
	Control	59	3.41	1.55	
1 month	PRP	54	2.94	1.9	0.149
	Control	59	3.41	1.55	
3 months	PRP	54	3.04	1.91	0.246
	Control	59	3.46	1.55	
6 Months	PRP	54	3.09	1.8	0.067
	Control	59	3.73	1.39	

Table 3: *Comparison between PRP Group and Control Group on Function Subscale of WOMAC Index*

	Group	No of cases	Mean	Sd	P- value
Before	PRP	54	45.33	11.74	0.186
	Control	59	42.49	12.11	
15 days	PRP	54	32.37	10.32	0.007
	Control	59	39.61	11.21	
1 month	PRP	54	32.26	14.29	0.007
	Control	59	39.63	11.22	
3 months	PRP	54	33.13	14.04	0.006
	Control	59	40.25	10.96	
6 months	PRP	54	33.91	13.73	<0.001
	Control	59	42.31	10.24	

Mean dose of paracetamol at baseline was 8.75/week. It decreased to 5.28 at 15th day, 5 at 1 month, 5.09 at 3 months and 5.63/week at 6 months follow-up. Standard deviation of dose of paracetamol was 6.71 at baseline. It was 4.66 at 15th day, 4.47 at 1 month, 4.75 at 3 month and 5.07 at 6 months follow-up. Mean dose decreased at 15th day follow-up, then remained almost same up to 6 months follow-up. On application of Paired t-test between baseline and follow-ups, this difference was statistically significant (p value-0.005) at all follow-

ups. It started decreasing at 6 months follow-up (p value 0.028).

Two patients complained of mild fever on day 1 of PRP injection. Three patients complained of excessive pain during injection. In control group 10 patients complained of acid peptic disease. Fifteen patients of control group changed their drugs because of no relief.

Almost half patients had a diagnosis of hypertension or diabetes or both. Physical therapy modalities were advised by their physicians. But due to pain and stiffness secondary to osteo-arthritis knee, they could not follow the exercise regimen.

Discussion:

The use of growth factors has become increasingly popular to modulate the healing process in damaged tissues. Autologous PRP appears to offer an easy and promising solution for delivering multiple growth factors needed for tissue repair. PRP is the product of centrifugation of autologous whole blood to obtain plasma with an increased platelet concentration compared with whole blood[12,13].

The current literature is complicated by a lack of standardisation of study protocols, platelet separation techniques, and outcome measures. As a result, there is uncertainty about the evidence to support the clinical use of platelet rich plasma and autologous blood concentrates as a treatment modality.

The purpose of this study was to assess the effectiveness of intra-articular PRP injections in patients with osteo-arthritis knee in terms of pain and quality of life.

On comparison of NRS between study group and control group, there was no statistically significant difference (p value 0.172) at baseline, which suggests that both the groups were comparable. Up to 1 month, the difference in scores between the two groups increased, but was not statistically significant (p-value 0.068). At 3 and 6 months follow-up, this difference became statistically significant (p-value 0.023 and p-value <0.001) respectively.

Initially both groups showed improvement but in PRP group improvement was sustained up to 3 months. Then at the end of 6 months slight reduction in improvement was detected in the study group, which suggests that PRP should be repeated between 3 and 6 months for cumulative effect. This finding is in complete agreement with the literature. Napolitano *et al*[14] and Spakova *et al*[15] demonstrated improvement in NRS at the end of 3 months and 6 months in their study. But none of them used controls for comparison. Further research is required to support this statement.

Mean scores on WOMAC scale decreased dramatically at 15th day follow-up and remained at the same level up to 6 months. This difference was statistically significant (p-value <0.001) at all follow ups.

On comparison of WOMAC index between study group and control group, there was no statistically significant difference (p-value 0.18) at baseline. At 15th day the difference was statistically significant (p-value 0.011). At 3 and 6 months follow up, this difference became statistically significant (p-value 0.008 and 0.001 respectively).

Patel *et al*[16], showed similar improvement in mean WOMAC scores where it decreased from 49.86 to 27.18 at six months in group receiving single white blood cell filtered PRP injection and from 53.2 to 30.48 in group receiving 2 white blood cell filtered PRP injections at 3 weeks interval. But score worsened from 45.54 to 53.09 in group receiving single normal saline injection.

Cerza *et al*[17] conducted a comparative study between intra-articular PRP and hyaluronic acid group. Their results showed significant improvement in mean WOMAC scores in both PRP group (79.6 to 36.5) and hyaluronic acid group (75.4 to 65.1) at 24 weeks. This is in complete agreement with our results. Similar sustained improvement was seen by Spakova *et al*[15], Li *et al*[18], Sanchez *et al*[19] and Napolitano *et al*[14].

Mean score of PRP group on pain subscale of WOMAC index decreased dramatically at 15th day follow-up and remained at this level at 6 months follow-up. This difference was statistically significant (p-value <0.001) at all follow-ups. Mean scores of pain subscale of WOMAC in control group decreased up to 1 month follow-up, but started increasing at 3 months follow-up and increased further at 6 months follow-up also. This difference was statistically significant (p-value <0.001) up to 3 months follow-up, and became insignificant (p-value 0.47) at 6 months follow-up.

On comparison of pain subscale of WOMAC index between PRP group and control group, the difference was not statistically significant (p-value 0.158) at baseline. At 15th day the difference was statistically significant (p-value 0.026). At 3 and 6 months follow-up, the difference was statistically significant (p-value 0.009 and p-value 0.001 respectively).

Patel *et al*[16] showed similar improvement in mean pain score of WOMAC index. Filardo *et al*[20] reported significant improvement in pain scores on visual analogue scale and on International knee documentation committee score.

In our study, mean score of control group on stiffness subscale of WOMAC index decreased slightly up to 3 months follow-up, but started increasing at 6 months follow-up. This difference was statistically significant (p-value <0.02) up to 1 month follow-up, remained significant (p-value 0.001) at 3 months and became insignificant (p- value 0.555) at 6 months follow-up. Mean score of PRP group on stiffness subscale of WOMAC index decreased dramatically at 15th day follow-up and remained at this level at 6 months follow-up. This difference was statistically significant (p-value <0.001) at all follow-ups.

On comparison of stiffness subscale of WOMAC index between study group and control group, there was no statistically significant difference (p- value 0.426) at baseline. At 15th day the difference increased, but was not statistically significant (p- value 0.125). At 3 months follow-up, this difference decreased (p- value 0.246) but at 6 months follow-up, this difference increased, though was not statistically significant (p- value 0.067). Similar improvements were seen on function subscale.

All these results were in complete agreement with the previous literature. Patel *et al*[16] and Sampson *et al*[21] showed similar improvement in mean stiffness and function score of WOMAC index. Spakova *et al* [15],Cerza *et al*[17] and Sanchez *et al*[19] did not mention changes in subscales of WOMAC index.

We recorded a platelet concentration which was 2.3 times higher than patient's whole blood. PRP had 5.41 times less white blood cell and 81.89 times less red blood cells. Napolitano *et al*[14] used the PRP of 2.3 times higher platelet counts. Patel *et al*[16] used WBC filtered PRP of three times higher platelet counts.

Our results suggest that PRP not only was able to relieve pain but also improved the functional capacity of patients. But the effect of PRP lasted till 3 months and by the end of 6 months most of the scores started to come to baseline. Similar results were reported by Sampson *et al*[21].

The consumption of paracetamol at the start of study was 8.75per week, but at the end of 6 months mean dose decreased to 5.63 per week. This difference was statistically significant, indicating that the effect of PRP in reducing pain continued up to 6 months.

PRP infiltration shows marked improvement in pain and functional disability, but its effect on stiffness was inconsistent. In our study this improvement sustained up to 3 months. There was no carry over effect of PRP to more than 3 months. This study clearly suggess that PRP can effectively be used to manage osteo-arthritis knee, but further studies are required to standardise the treatment protocols and method of preparation of PRP for clinical purpose.

Conclusions:

PRP improves the pain and functional disability in early stage of osteo-arthritis knee over and above the standard conservative treatment. It shows better compliance and efficacy than any available treatment. The effect tends to taper off between 3 to 6 months. More randomised control trials are needed to standardise the treatment and include PRP infiltration as a part of standard regime.

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Obturator Nerve Blocks Using 5% Aqueous Phenol for Treatment of Adductor Spasticity in Children with Cerebral Palsy and Its Effects on Spasticity and Function

Ahmed T [1], Das P[2], De Saumen[3], Siddhartha Sinha Ray[4], Haldar RN[5]

Abstract

Study design: Before-after treatment trail.
Place of study: Institute of Post Graduate Medical Education and Research, Kolkata.
Duration of study: 1st April 2013 to 31st September 2015.
Study population: OPD patients attending Dept. of PM&R at Institute of Post Graduate Medical Education and Research, Kolkata.
Intervention: Forty children aged between 6 and 12 years, suffering from diplegic CP with hip adductor spasticity were given bilateral obturator nerve blocks with 5% aqueous phenol after localisation by electrical stimulation.
Results: Subjects were assessed before intervention and after intervention at 1week, 1 month and 3 months. There was statistically significant improvement in all the outcome parameters of spasticity measured by modified Ashworth scale, gait speed measured by 10 metre walk test and perineal hygiene measure by Likert scale.

Key words: **Cerebral palsy, spasticity, phenol.**

Introduction:

Cerebral palsy (CP) is a common neuromuscular disability affecting children all over the world. Over the years there have been massive improvements in perinatal and neonatal care, but the incidence rate has remained almost constant at 1.5 to 2.5 per 1000 live births[1].

Adductor spasticity is a common condition affecting these children causing difficulties in normal gait, maintenance of perineal hygiene and other activities of daily living [2,3].

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There are many ways to control spasticity in CP patients egoral drugs such as baclofen, benzodiazepines, Tizanidine etc., different types of orthosis such as ankle foot orthosis(AFO),different types of hip abduction orthosis, serial casting can also be used for control of spasticity. Along with these methods local control of spasticity can be done by targeting specific nerves and muscles by phenol or alchohol solutions. Botulinum toxin is also used to target specific muscles for control of spasticity. Phenol causes chemical neurolysis when used in concentrations of 3% and above[4].In this study we have used 5% aqueous phenol for control of adductor spasticity by nerolysing the obturator nerve (ON) [5].

Aims and Objectives:

1. To compare spasticity of hip adductor muscles before and after block by modified Ashworth scale (MAS).
2. To evaluate the effects of obturator nerve blocks on maintenance of perineal hygiene by Likert scale.
3. To evaluate the effects of obturator nerve blocks on gait speeds by 10 metre walk test.

Materials and Methods:

Sample Size -- MAS was taken as the most important parameter for detecting sample size. It was calculated that at least 40 subjects would be needed to detect statistically significant changes in values of MAS.

Study Area – Department of Physical Medicine and Rehabilitation IPGME&R and SSKM Hospital, Kolkata.

Study Population – Spastic cerebral palsy children attending OPD of Dept. of PMR at SSKM Hospital, Kolkata were included in the study after screening through inclusion and exclusion criteria.

Study Design – Before-after treatment trial.

Study Duration – 1st April 2013 to 31st September 2015 (18 months).

Before the start of the study clearance of the Institutional Ethics Committee (IEC) was taken. Informed written consent was taken from each patient/parents.

Inclusion Criteria.

1. Children with cerebral palsy having predominantly hip adductor spasticity and less involvement of other lower limb muscles such as hamstring and gastrosoleus.
2. Patients who could do independent ambulation.
3. Children in age group of 6-12 years.
4. Children who were taking conventional physiotherapeutic interventions for at least 3 months.

Exclusion Criteria.

1. Children with fixed adduction deformity of hip.
2. Patients with significant mental retardation, cortical blindness and deafness etc. who will not be able to follow instructions.
3. Patients with past history of convulsion.
4. Patients with history of sensitivity of phenol.

Children who had independent ambulation were included in the study as otherwise gait parameters could not be taken. Only those children who were aged between 6 years and 12 years were included in the study for standardisation of 10 metre walk test, as children outside this age group will have physiologically different gait parameters.

Patients with already tightened hip joint capsule or already shortened hip adductor muscles (MAS-4) were not included in the study as neurolysis of obturator nerve (ON) will not cause any effect in them resulting in false negative cases.

Study Parameters – Modified Ashworth scale for spasticity, Likert scale for perineal hygiene and10 metre walk test for improvement in gait parameters.

Study Tools – Disposable syringe and needles, sterile gloves, rectified spirit, sterile gauze pieces, 5% aqueous phenol, Teflon coated regional analgesia needle (35 and 50mm), a small percutaneous direct current stimulator for nerve localisation, a 10 metre walkway, a stopwatch.

Study Techniques – Selected patients were given bilateral obturator nerve block using 5% aqueous phenol. The patients were placed in supine position, with legs abducted. A mark was made on the skin 1 to 2 cm. medial to the femoral artery just below the inguinal ligament. This mark was used to indicate the direction of the needle toward the obturator canal. The adductor longus tendon was then identified near its insertion site at the pubis. The Teflon coated needle was attached to an out syringe which contained 5% aqueous phenol. Generally in case of small children 35mm needle was used, however in case of little older and bulky children 50mm size of needle was used. The needle was introduced behind the adductor longus tendon and directed laterally, with a slight posterior and superior inclination toward the skin mark. The needle was advanced until adductor muscle contraction was elicited with a nerve stimulator. Then the needle was manipulated to a point where maximum contraction was visible with minimum current applied by the nerve stimulator. After negative aspiration, phenol solution was injected.

The patients were assessed before giving the blocks and after 1week, 1month and 3months of blocks.

For measurement of hip adductor spasticity modified Ashworth scale was used (Table 1) [6].

For ease of statistical calculation 1+ was taken as 2 to make it an ordinal scale.

Table 1 : *Showing MAS Description*

Score	MAS Description
0	No increase in muscle tone
1	Slight increase in muscle tone manifested by catch and release or minimal resistance at the end of ROM
1+	Slight increase in muscle tone manifested by catch and minimal resitance throughout the remainder of ROM
2	More marked increase in muscle tone through most of ROM but affected parts moved easily
3	Considerable increase in muscle tone, passive movement difficult
4	Affected parts rigid in flexion and extension.

For measurement of perineal hygiene Likert scale was used (Table 2)[7].

Table 2 : *Liker Scale Description*

Score	Description
1	Can be performed without difficulty
2	Can be performed with little difficulty
3	Can be performed with moderate difficulty
4	Can be performed with great difficulty
5	Cannot be performed

For measurement of gait speed 10 metre walk test was used[8,9]. A clear 10 m walkway was made with two lines at 2m and 8m , this was done to record the speed at middle 6m of the walkway to negate the effects of acceleration and deceleration. Data were recorded at normal comfortable walking speed.

Results:

Forty children were included in the study in age group of 6 to 12years of which 15 were male and 25 female.

MAS for hip adductor muscle spasticity, Likert scale for perineal hygiene and speed in metre/sec for 10 metre walk test were analysed by repeated measures ANOVA followed by Tukey's multiple comparison test. Statistical calculation was done by Graphpad Prism 5 software.

For hip adductor spasticity it was seen that most of the improvement occurred in the 1st week itself as reflected by mean difference of MAS between before block and at 1week follow-up being 1.400, after that there was sustained reduction of spasticity at 1month and 3 months, all the intergroup comparison were statistically significant except comparison between 1 week *versus* 1 month and 1m *versus* 3m. Effect of the blocks were maintained for the duration of study of 3months. The comparison between reduction of MAS at baseline and different stages of follow-up are depicted in Table 3.

In case of perineal hygiene there was statistically significant improvement at 1st week after ON block reflected by mean of Likert score before ON block being 3.025 and at 1week after injection being 2.10 , however between 1month (mean Likert Score-1.475) and 3 months there was no improvement (Fig 1).

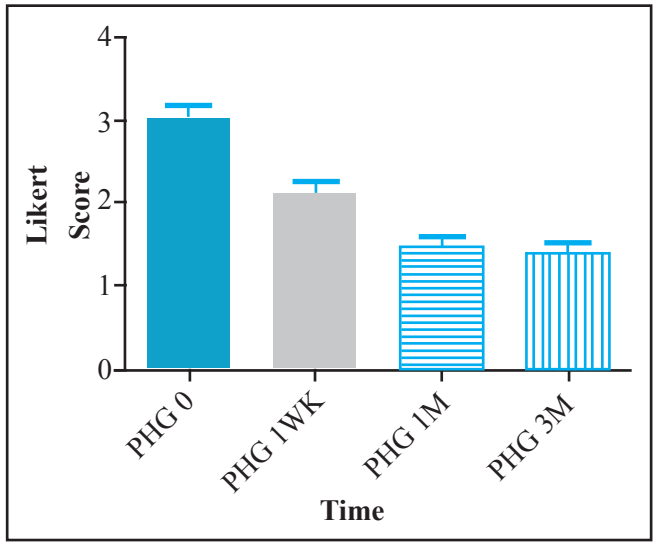

Fig 1 - Showing Perineal Hygiene

[PHG 0, PHG 1WK, PHG 1M AND PHG 3M denote the mean values of Perineal hygiene as measured by Likert scale at baseline, 1week, 1month and 3 months respectively]

In case of gait speed measured by 10m walk test it was observed that there was gradual increase of gait speed from 0.704m/s at baseline to 0.951 m/s at 3months, the increase in speed was statistically significant in all comparisons except 1week versus 1month and 1month *versus* 3 months (Table 4).

Table 3 : *Showing Interpretation of MAS by Turkey's Multiple Comparison Test*

Tukey's multiple comparison test	Mean difference	If $p < 0.05$ yes or no	95% CI of difference
MAS 0 versus MAS 1 week	1.400	Yes	1.031 to 1.769
MAS 0 versus MAS 1 month	1.700	Yes	1.331 to 2.069
MAS 0 versus MAS 3 months	1.925	Yes	1.556 to 2.294
MAS 1 week *versus* MAS 1month	0.3000	No	-0.06939 to 0.6694
MAS 1 week *versus* MAS 3months	0.5250	Yes	0.1556 to 0.8944
MAS 1 month *versus* MAS 3months	0.2250	No	-0.1444 to 0.5944

[MAS 0 ,MAS 1week, MAS 1 month and MAS 3 months denote the mean values of MAS at baseline, 1week, 1month and 3months respectively]

Table 4 : *Showing Interpretation of Metre Walk Test by Turkey's Multiple Comparison Test*

Tukey's multiple comparison test	Mean difference	If $p < 0.05$ or not	95% CI of difference
10 metre walk test O *versus* 10 metre walk test 1week	-0.1173	Yes	-0.2119 to -0.02264
10 metre walk test O *versus* 10 metre walk test 1month	-0.1833	Yes	-0.2779 to -0.08864
10 metre walk test O *versus* 10 metre walk test 3months	-0.2470	Yes	-0.3416 to -0.1524
10 metre walk test 1week *versus* 10 metre walk test 1month	-0.06600	No	-0.1606 to 0.02861
10 metre walk test 1week *versus* 10 metre walk test 3months	-0.1298	Yes	-0.2244 to -0.03514
10 metre walk test 1month *versus* 10 metre walk test 3months	-0.06375	No	-0.1584 to 0.03086

[10MWT 0, 10MWT 1WK ,10MWT 1M and 10WMT 3M denote mean value of gait speed at baseline, 1week,1month and 3months respectively]

Discussion:

Phenol is a cheap and cost effective means to control spasticity, various studies have shown it to be potent measure of control of spasticity. However in the recent past especially after the advent of botulinum toxin, phenol has gradually fallen out of favour. One of the main concern of using phenol is that it can cause persistent painful dyesthesias,but if used in on obturator and posterior tibial nerve which are predominantly motor nerves with less sensory distribution chance of dyesthesia is very less[10]. So phenol in different concentrations is used to treat adductor spasticity and gastrosoleus spasticity. In our study of 40 children we administered 80 ON blocks with 5% aqueos solution of phenol, we did not get any case of persistent dysesthesia.

There was significant reduction in hip adductor spasticity as measured by MAS, the reduction in spasticity was apparent in the follow-up at 1st week after block. Effect of the blocks were maintained for the duration of study ie 3 months. Akkaya *et al*[11]. performed ON block using phenol in patients with severe hip adductor spasticity with the help of nerve stimulator and fluoroscopic guidance. They reported that the decrease in spasticity lasted for about 3 months[11]. Various studies about the period of effectiveness ranged from 3months to 1 months[12,13], so compared to botulinum toxin duration of effect is longer.

Veil *et al* [14] performed ON block through fluoroscopic guidance on 23 patients to see its effect on improvement of perineal hygiene and found there was significant improvement. Our study also showed statistically significant improvement in perineal hygiene as measure by Likert scale. In our study we used intra-adductor technique with electrical stimulation as guidance for ON block which was first used by Wassef[15]. Ofluoglu *et al* [16] did a retrospective study on 23 patients with adductor spasticity for gait parameters after phenol block, they did not find any change in gait speed or step length,there was increase in base of support which is expected. In our study we wanted to concentrate solely on the effect of obturator nerve block on speed of walking,it was seen that there was statistically significant improvement in walking speed after intervention, most of the improvements were seen during the 1st week follow-up itself in later follow-up improvement was less. The limitations of the study included short duration and small sample size we could not record the full duration of effect. Although care was taken during patient selection, many patients had varying degrees of involvement of other lower limb muscles such as hamstring and gastrosoleus in addition to adductor spasticity , these must have acted as confounding factors.

In conclusion our study has shown that phenol neurolysis is an effective means of improving spasticity and function when used for ON block without causing much adverse effects.

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Original Article

Comparative Study of Efficacy of UST *versus* Local Corticosteroid Injection in the Treatment of Plantar Fasciitis

Sen Mausumi[1], Pramanik Rajesh[2], Ghosal Vasundhara[3], Biswas MM[4]

Abstract

Objective: To compare the efficacy between ultrasound therapy (UST) and local corticosteroid injection (INJ) in the management of plantar fasciitis.

Methodology: This prospective randomised analytical study was done at the Dept of PMR, Sambhunath Pandit Hospital, Kolkata for a period September2007- August 2009. Patients suffering from plantar fasciitis with duration more than 4 weeks were included in our study. Patients unable to give consent, congenital heel deformity, active infection, conditions where local corticosteroid injection and ultrasound therapy are contra-indicated, referred pain from other places and peripheral vascular disease were excluded from our study. After randomisation patients were divided into two treatment groups for comparative study (UST *versus* local corticosteroid injection) for treatment of plantar fasciitis. Group A patients receive UST at a dose of 0.5 W/Cm2 pulsed (1:4) locally for 8 minutes, 6 days /week for 2 weeks at initial period. Group B patients received two doses of injection corticosteroid (triamcinolone-20 mg) given at O and 2 weeks. Both of the groups received some basic management which included shoe modification and exercise therapy and NSAIDs when needed.

Assessment scales: VAS (Pain), FFI (foot function index).

Results: Both UST and local corticosteroid injection were effective mode of treatment for plantar fasciitis but effects of corticosteroid injection were prolonged as compared to UST.

Key words: **Corticosteroid injection, ultrasound therapy, plantar fasciitis.**

Introduction:

Heel pain is a common clinical problem of the patients attending Physical Medicine and Rehabilitation OPD. According to 'Heel pain guide line 2010' Plantar heel pain is the most prevalent complaint presenting to foot and ankle specialist and may be seen in up to 11-15% in adult[1]. Plantar fasciitis is the most common cause of heel pain[2,3]. It is not only significantly uncomfortable but sometimes it may be so distressing that it can interfere with activities of daily life. A major part of these patients ignore their problems at early stage, often self medicate with the idea that pharmacotherapy alone would cure their ailments. However management of heel pain embraces an understanding of anatomy and biomechanics of the foot and the ailments are needed to be addressed with different mode of treatment other than pharmacotherapy alone. There are lots of modalities available in the physiatrist's armamentorium to counteract the condition but there is scarcity of specific recommendations regarding treatment protocols of plantar fasciitis. Though there are many treatment options like different physical modalities, exercise therapy, shoe modification, local corticosteroid injection, orthosis, etc are available for plantar fasciitis but only a few supportive literature for comparative studies of different mode of treatment are available. This project is a humble attempt to find out the demographic distributions of plantar fasciitis and to compare the role of UST and local infiltration of steroid injection in heel pain.

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Materials and Methods:

Place of Study:

The study was conducted in the department of Physical

Medicine and Rehabilitation, Sambhunath Pandit Hospital, Kolkata.

Period of Study: September 2007– August 2009.

Inclusion Criteria: Patients presenting with heel pain diagnosed as plantar fasciitis with duration more than 4 weeks.

Exclusion Criteria:

1. Unable to give consent.
2 Acute heel pain less than 4 weeks.
3. Congenital heel deformity.
4. Active infection and inflammatory conditions.
5. Contra-indications of local corticosteroid injection (infection, diabetes mellitus, osteoporosis, etc).
6. Contra-indications of ultrasound therapy (eg. insensitivity, neoplasm. diabetes mellitus, bleeding diatheses, etc).
8. Referred pain and peripheral vascular diseases.

Study Design: Prospective randomised analytical study.

Randomisation : Patients presenting with heel pain, diagnosed as plantar fasciitis primarily by history and clinical examination and supportive investigation like straight x-ray of heel . Study was carried out according to the stipulated proforma after taking permission from institutional ethical committee. Patient's consent has also taken beforehand. Total number of patients of our study was 94. They were randomly divided into two treatment groups–group A and group B, 47 patients in each group for comparative study of different modalities and total number of visit for each patient was 3 [one initial visit(visit-1),two follow-up visits at 6 weeks (visit-2) and 12 weeks (visit-3) after the initial visit].

Intervention:

Patients with plantar fasciitis were given following treatment –

Group A----- Local ultrasound therapy (UST)

Group B---- Local corticosteroid injection (INJ)

Patients of both these groups got some basic management which included exercise therapy, shoe modification, NSAID when needed and patient education like avoidance of bare foot walking ,wearing of proper shoes, weight reduction on the basis of BMI .

UST was advised at a dose of 0.5 W/Cm2 pulsed (1:4) locally for 8 minutes, 6 days /week for 2 weeks at initial period.

Two doses of injection corticosteroid (triamcinolone-20 mg) with local anaesthetic agent (0.5 ml of 2 % lignocaine) were given at 0 and 2 weeks.

Shoe modification—Shoe modification used for plantar fasciitis is heel cushion or resilient heel and excavated insole filled with soft rubber (MCR)

Assessment:

- Demographics and medical history were taken at visit 1.
- Vital signs were recorded at all visits.
- Physical examinations were done at visit 1,visit 2,visit 3.
- Investigations done-

  HB, TC, DC, ESR, blood sugar (PP) at initial visit.

  Straight X ray of foot – Lateral view at initial visit.
- Patients were assessed on a visual analogue scale (VAS) and foot function index (FFI) at each visit.
- Clinically also looked after at each visit regarding adverse effect and those detected or complained of, were recorded and treated promptly.
- VAS –Assessment of heel pain was done by VAS (0 to 10) where 0 is no pain and 10 is maximum pain.
- The foot function index (FFI) is a widely used self-reported measure of health-related foot function. A foot function index was developed to measure the impact of foot pathology on function in terms of pain, disability and limitation of activities. The FFI is a self-administered index consisting of validated self reported of questionnaires.

Outcome Measures : After completion of study all the available data were analysed to reach the objective of the study. Software used STATISTICA version 6 [Tulsa, Oklahoma: StatSoft, Inc.; 2001] and Graph Pad Prism version 4 [San Diego, California: GraphPad Software Inc.; 2005] were used.

Results and Analysis :

Data collected in our study were analysed using appropriate statistical tests and results obtained. Helps of statistical charts and diagrame was also taken to represent statistical data.

Sample size: Total number of patients included in our study was 94, 47 patients in each group.

The youngest patient was 22 years and the oldest was aged 70 years(average age group 44.12). Maximum

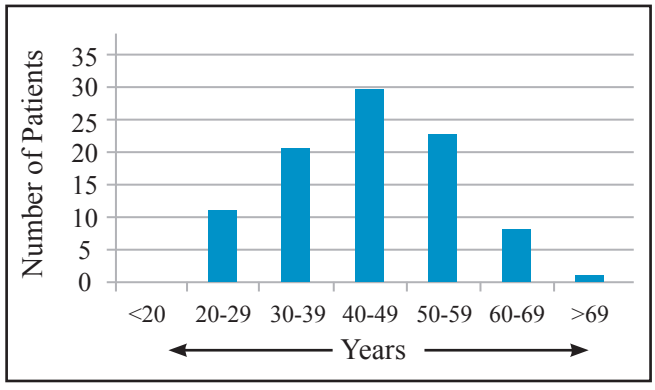

Fig 1 - Age Distribution of Patients

number of patients were between 40 and 49 years, followed by 50-59 years age group (Fig1).

In our study number of male patients were 36 (38.29%) and 58 patients (61.71%) were female with a male to female ratio is 1:1.6 (Fig 2).

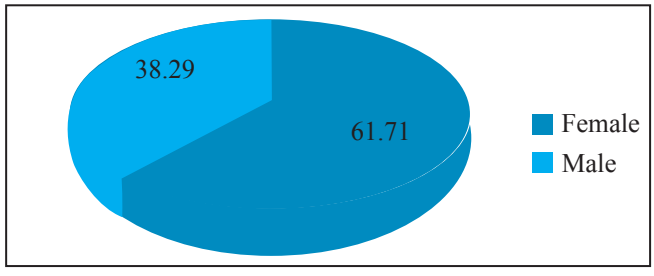

Fig 2 - Sex Distribution

Most patients were involved in house hold work (HHW), followed by people whose works demand prolonged standing(PS). Patients working at offices(OFC), doing agricultural work (AGW) were also involved in a good number. Retired person (RTD) with sedentary life, students were also suffering from plantar fasciitis (Fig3).

Distribution of BMI - Mean BMI was 26.34 (range 21.9- 33.2).

Table 1 and Fig 4 show the improvement of VAS and

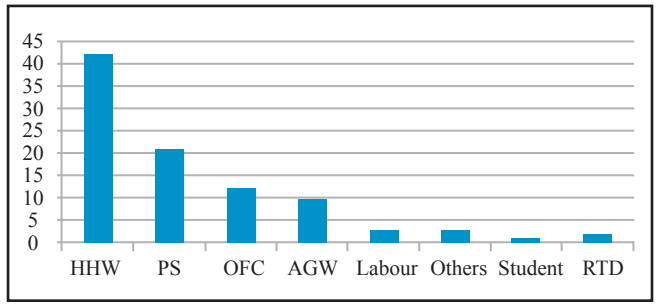

Fig 3 - Occupation Distribution

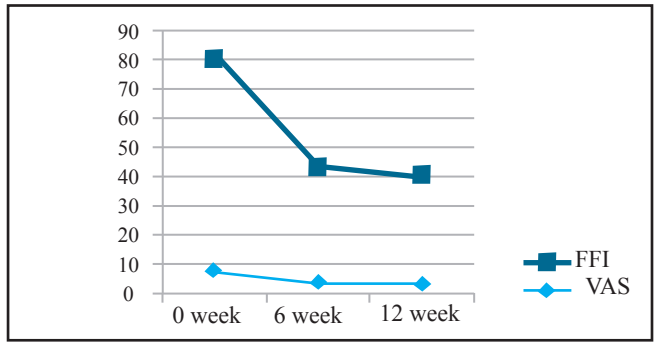

Fig 4 - Group A Managed by UST

FFI score occur in UST group (group A) throughout the follow -up period of 12 weeks. But improvement is more in first 6 weeks of follow-up.

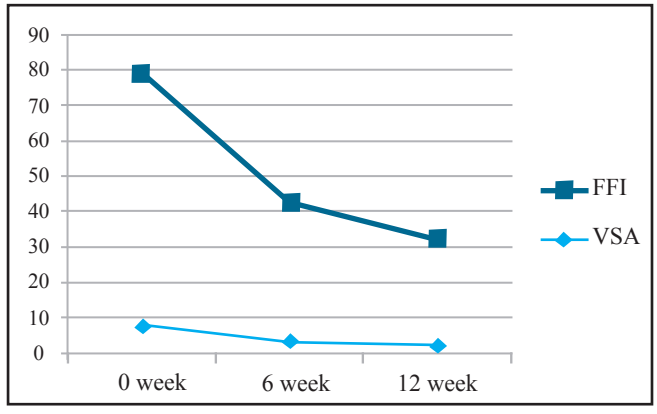

Fig 5 - Group B Managed by INJ

Table 1 : *Group A – Managed by UST*

	Valid N	Mean	Median	Minimum	Maximum	Std. Dev.	Standard Error
AGE	47	46.27660	45.00000	22.00000	69.00000	11.26306	1.642887
BMI	47	27.21277	27.10000	21.90000	33.20000	2.83339	0.413292
VAS1	47	8.40426	8.00000	6.00000	10.00000	0.97042	0.141551
VAS 2	44	3.86364	4.00000	2.00000	6.00000	0.85156	0.128378
VAS 3	44	3.38636	3.00000	2.00000	5.00000	0.89484	0.134902
FFI 1	47	72.28511	72.30000	64.10000	78.20000	2.95392	0.430874
FFI 2	44	40.00227	40.00000	26.40000	50.10000	5.75360	0.867388
FFI 3	44	36.98250	37.60000	26.00000	48.80000	4.76562	0.718444

Table 2: *Group B –Managed by INJ*

	Valid N	Mean	Median	Minimum	Maximum	Std.Dev.	Standard Error
AGE	47	41.95745	41.00000	25.00000	70.00000	10.03463	1.463701
BMI	47	25.46809	25.20000	22.80000	31.30000	1.64662	0.240184
VAS 1	47	8.00000	8.00000	6.00000	10.00000	0.97802	0.142659
VAS 2	46	3.82609	4.00000	2.00000	6.00000	0.94996	0.140063
VAS 3	45	2.15556	2.00000	1.00000	4.00000	0.82450	0.122909
FFI 1	47	70.84468	71.10000	64.10000	78.20000	3.15428	0.460099
FFI 2	46	39.03478	38.20000	28.40000	58.80000	5.90455	0.870578
FFI 3	45	29.99556	28.80000	23.50000	42.30000	4.57309	0.681716

Table 2 and Fig 5 show improvement of VAS and FFI in patients treated with local corticosteroid injection throughout the follow-up period of 12 weeks.

Comparison of VAS score and FFI in group A and group B:

It is seen that VAS score of both INJ and UST group are same at 6 weeks but improvement of VAS score was more in INJ group at 12 weeks (Fig 6). FFI score of both INJ and UST group are at par at 0 and 6 weeks but improvement of FFI is more in INJ group at 12 weeks (Fig 7).

Change OF VAS and FFI within each group (Tables 3&4) :

By repeated measures ANOVA followed by Tukey's test was clearly seen that VAS score improved consistently by UST at 6 weeks and 12 weeks with statistical significance (VAS1 *versus* VAS 2, p value<0.001 and VAS2 *versus* VAS 3, p value <0.05). On the contrary improvement of FFI was consistent up to 6 weeks (FFI 1 *versus* FFI 2, p value<0.001) of treatment period. Thereafter FFI fails to improve significantly until the end of the study period (FFI 2 *versus* FFI 3, p value>0.05). Local infiltration of injection is effective to improve both VAS score (p value<0.001) throughout the follow-up period up to 12 weeks. In our prospective analytical study improvement of FFI score (p value<0.001) also occured significantly throughout the follow-up period up to 12 weeks.

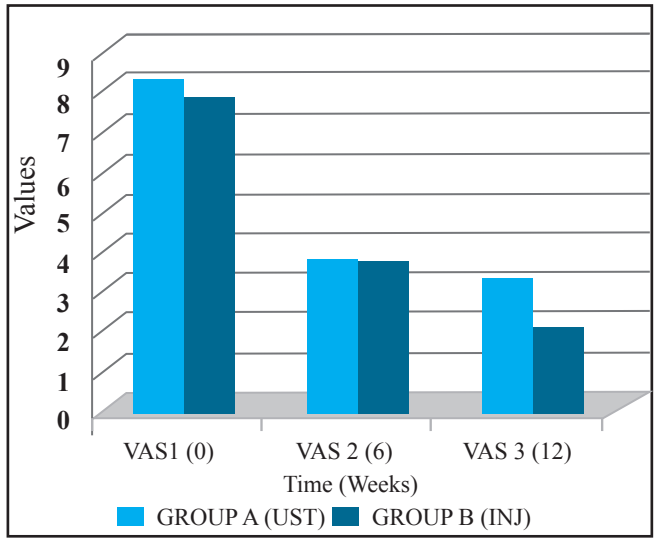

Fig 6 - Comparison of VAS score between group A (UST) and B (INJ)

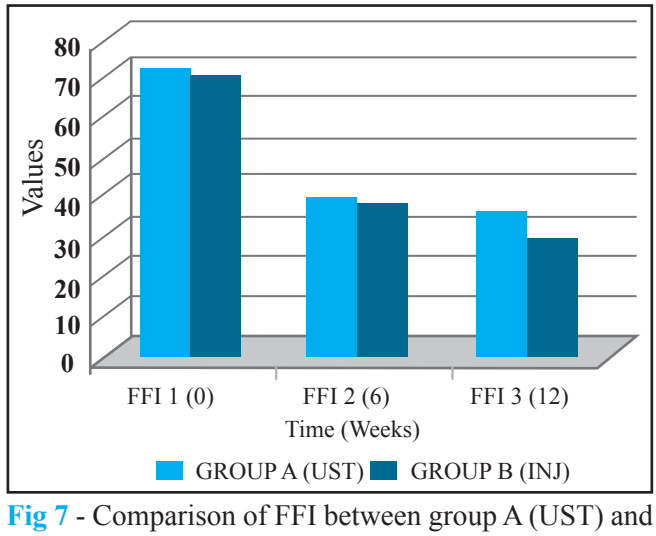

Fig 7 - Comparison of FFI between group A (UST) and B (INJ)

Discussion:

Our study included 94 patients with mean age 44.12 years (range 22-70 years) It included 36 males and 58 females with a male to female ratio 1:1.6 which is compatible with Chigwanda series[4] where mean age of plantar fasciitis is 48.5 years and majority were females.

Obesity is not only a risk factor for plantar fasciitis[5,6], even relapse is common in obese patients[7]. In our study the mean BMI of 94 patients was 26.34 (range21.9-33.2) which suggests a correlation between plantar

Table 3 : *Changes of VAS within Group A (UST) and Group B (INJ)*

	Tukey's Multiple Comparison Test	Mean Diff.	Q	P value	95% CI of diff
Group A (UST)	VAS 1 vs VAS 2	4.2766	32.514	P < 0.001	3.8325 to 4.7207
	VAS 1 vs VAS 3	4.7234	35.911	P < 0.001	4.2793 to 5.1675
	VAS 2 vs VAS 3	0.44681	3.3969	P < 0.05	0.0027464 to 0.89087
GROUP B (INJ)	VAS 1 vs VAS 2	4.1277	35.045	P < 0.001	3.7300 to 4.5253
	VAS 1 vs VAS 3	5.7234	48.593	P < 0.001	5.3258 to 6.1210
	VAS 2 vs VAS 3	1.5957	13.548	P < 0.001	1.1981 to 1.9934

Table 4 : *Changes of FFI within Group A (UST) and Group B (INJ)*

	Tukey's Multiple Comparison Test	Mean Diff.	Q	P value	95% CI of diff
GROUP A (UST)	FFI 1 vs FFI 2	30.483	35.958	P < 0.001	27.621 to 33.345
	FFI 1 vs FFI 3	33.31	39.293	P < 0.001	30.448 to 36.172
	FFI 2 vs FFI 3	2.827	3.3348	P > 0.05	-0.034998 to 5.6890
GROUP B (INJ)	FFI 1 vs FFI 2	31.277	46.685	P < 0.001	29.015 to 33.538
	FFI 1 vs FFI 3	40.157	59.941	P < 0.001	37.896 to 42.419
	FFI 2 vs FFI 3	8.8809	13.256	P < 0.001	6.6191 to 11.143

fasciitis with increased body weight.

In our study highest incidence of plantar fasciitis was found to occur in subjects with occupation of house hold work (44.68 %). Next comes the patients whose occupation needs prolonged standing (22.34%). Most of the patients in our study were housewives and many of them were barefooted particularly at home. Many people involved in agricultural work were also barefooted. As per literature review barefoot walking and prolonged standing are some of the risk factors for plantar fasciitis[5]. It is also supported by plantar pressure studies by Cavanagh *et al*[8] of subjects standing barefoot have determined that the distribution of load in the heel 2.6 times greater than forefoot when the subject stands barefooted. The shoe wear reduces peak heel pressure producing a more even distribution of pressure under heel.

Another interesting finding was noted about the role of much discussed radiological calcaneal spur as a causative factor of plantar fasciitis. In our 94 patients only 39 patients (41.49%) had calcaneal spur , compatible with Chigwanda series[4], where 60% have no spur. As per literature review calcaneal spur sometimes seen on x-ray is not a cause but as a type of traction lesion in the plantar ligament or flexor digitorum brevis muscle[9]. Spur is also found in normal asymptomatic patients[10]. The symptomatic loss of elasticity of plantar fascia with the onset of middle age suggests that this subset of patients would be expected to show an increased incidence of spur noted on radiography[11].

According to the study by Crawford and Snaith[12] with objective to evaluate the therapeutic effect from ultrasound in the treatment of plantar heel pain, a reduction in pain without any statistical significance noticed due to UST [the improvement was 30% in the treated group and 25% in the placebo group (p = 0.5)]. They concluded that therapeutic ultrasound at a dosage of 0.5 w/cm2, 3 MHz, pulsed 1:4, for eight minutes is no more effective than placebo in the treatment of plantar heel pain.

In our present study comprising 94 patients of plantar fasciitis, comparable as par age, BMI and VAS and FFI at initial visit, a definite role of UST and injection corticosteroid was established by statistical evidences. It is seen that improvement of pain and function occur both 6 weeks and 12 weeks.

In group A patients of our study it was clearly seen that VAS score was improved by UST at 6weeks and12

weeks with statistical significance (p value<0.05). On the contrary improvement of FFI was consistent up to 6 weeks of treatment period(p value <0.05). Thereafter FFI fails to improve until the end of the study period (p value >0.05). Hence we may conclude that effect of UST in management of plantar fasciitis is possibly not long lasting.

In group B of our study local infiltration of injection is effective to improve both VAS score (p value<0.001) and FFI (p value<0.001) throughout the follow-up period up to 12 weeks. Although the improvement in terms of pain (VAS) and function (FFI) is more in first 6 weeks after starting of treatment, effect of local steroid is long lasting also. But unfortunately 5 patients (2 from INJ group and 3 from UST group) dropped out from our study.

Our observation was not supported by the finding of Frawford *et al*[13] who while evaluating the effectiveness of steroid injection for heel pain of 106 patients found that statistical difference in favour of treatment with inj. steroid at 1 month. No statistically significant difference in pain reduction could be detected between 3 months and 6 months (p value 0.9, 0.8) respectively. At the end of their study they concluded that a single steroid injection does not offer a therapeutic benefit in long term.

But our observation is supported by Genc *et al*[14] while evaluating the long-term efficacy of steroid injection for plantar fasciitis using clinical parameters and high-resolution ultrasonography. Palpation-guided steroid injection was applied to the 47 heels of 30 plantar fasciitis patients. Strong correlation was found between the changes of plantar fascia thickness and VAS values 1 month after ($p < 0.001$, r: 0.61) and 6 months after ($p < 0.001$, r: 0.49) steroid injection. They concluded that steroid injection could be used in plantar fasciitis treatment for its positive long-term effects.

At the end of the study it is seen both UST and local corticosteroid injections are effective mode of treatment in plantar fasciitis. UST shows improvement of VAS score throughout the study duration (p value<0.05) but failed to show improvement of FFI in the 2nd follow-up (p value>0.05).But local infiltration of corticosteroid injection is effective to improve VAS score and FFI throughout the study duration with statistical significance (p value<0.001).

Conclusions:

Female with the mean age group 44.12 years are the commonest victim of plantar fasciitis. Maximum number of patients are involved in household work. Both UST and local corticosteroid injections will effective (statistically significant with p-valve <0.05 at the end of the study) mode of treatment in plantar fasciitis. But the overall improvement is more with local corticosteroid injection as compared to UST in terms of pain relief and function as assessed by VAS and FFI respectively. But a larger sample with longer duration is needed to observe the long term effect of different modes of treatment.

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Biochemical Markers for Osteo-arthritis: Is There any Promising Candidate?

Elif Aydin[1], Yasemin Turan[2]

Abstract

Osteo-arthritis (OA) is the most common degenerative joint disease. Progressive destruction of articular cartilage is one of the prominent features of the disease. The diagnosis of the disease is generally based on clinical and radiographic findings, which are insufficient to determine early cases and predict disease course. There is a need for biomarkers that help early diagnosis, assess disease activity, predict prognosis and monitor therapeutic effects in patients with OA. There is a growing number of publication considering candidate markers in this field. Aim of this paper is to review recent assays that study biochemical markers which reflect cartilage, synovium and bone turnover and their clinical uses in patients with OA.

Key words: **Osteo-arthritis, biomarkers, bone, cartilage, synovium.**

Introduction:

Osteo-arthritis (OA) is the most common joint disorder characterised by progressive cartilage destruction, causing pain and loss of function. OA affects millions of individuals each year and becoming the most important pain cause of geriatric population. Articular cartilage, synovium and bone contribute to the pathogenesis of the disease. The diagnosis of OA is mainly based on clinical observation and radiologic aspects. Bone sclerosis, osteophyte formation and joint narrowing are well known radiological features of OA. Progression of cartilage destruction is evaluated with the measurement of joint space width by radiography. However radiologic evaluation is insufficient to determine early cases, when no significant joint damage has occurred yet. Also it is not possible to evaluate minor changes of cartilage by conventional radiography.

Therefore, there is an urgent need for new assessment tools with high sensitivity. In this respect laboratory markers have drawn great interest in recent years. Such molecular markers are promising for improving diagnosis, assessment of disease activity, prognosis and monitoring therapeutic effects in patients with OA. This report reviews recent assays that study biochemical markers which reflect cartilage, synovium and bone turnover and their clinical uses in patients with OA.

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Table 1: *Biochemical Markers for Osteo-arthritis* [1-3]

Tissue	Synthesis	Degradation
Bone	PICP, PINP, OC, ALPbone	PYD, DPD, CTX-1, NTX-1, ICTP, TRAP, BSP, Cathepsin K, Helical peptide
Cartilage	PIICP, PIIANP, PIIBNP, YKL-40, CS, CD-RAP	PYD, CTX-II, C2C, C12C,TIINE, Helix-II, Coll2-1, COMP, KS, Aggrecanase neopeptides, Coreprotein MMPs
Synovium	YKL-40, COMP, MMPs, HA, PIINP	PYD, CTX-I, NTX-I, Glc-Gal-PYD
Systemic inflammation	CRP, hsCRP, TGFβ1, TNFα, IL-6, IL-1, RAGE, ECP	

Biochemical Markers:

A biochemical marker refers to characteristic that is released from connective tissue matrices and objectively measured in biological fluids. An appropriate marker should be disease specific. In addition a good marker should be able to reflect actual disease activity, monitor changes with therapy and can predict the prognosis. Recently numerous markers have been suggested for identifying and monitoring OA. They can reflect cartilage and synovial breakdown and synthesis, bone turnover and inflammation (Table 1)[1-3]. These products can easily be obtainable from body fluids such as blood, urine or synovial fluids.

Cartilage Matrix Protein (COMP):

Cartilage matrix protein (COMP) is non-collagenous biochemical marker of cartilage degradation. It is primarily isolated from the extracellular matrix of cartilage[4]. High serum and synovial fluid levels were detected in various disease such as rheumatoid arthritis, OA, juvenile idiopathic arthritis and psoriatic arthritis[5-7]. Studies suggest that serum COMP levels can be used as a marker for cartilage destruction associated with OA. A meta-analysis by Hoch *et al*[8] concluded that serum COMP levels are elevated in patients with radiographic knee OA and higher levels of serum COMP are associated with radiographic OA severity. In a study[9] that examines the relationship between cartilage markers and cartilage loss on MRI in patients with knee OA, only COMP was found to be a predictor of cartilage loss. In another survey[10] femoral cartilage thickness detected by ultrasound was found inversely related to serum COMP levels in patients with early stage knee OA. Authors also reported that for every unit increase in COMP level, there was 33 % higher risk for tibiofemoral osteophyte progression[11]. In a study[12] with two hundred and seventy-two patients with knee OA patients, higher serum COMP levels were correlated with non-symptomatic narrowing of the articular space. Similarly, Conroizer *et al*[13] found that serum COMP level has a positive correlation with joint space narrowing in hip OA. In a recent study Golightly *et al*[14] investigate COMP, hyaluronic asid (HA), keratin sulphate (KS) and high sensitivity C-reactive protein (CRP) as a predictor of radiographic knee OA. Authors have suggested that high levels of COMP and HA may predict incident radiographic knee OA[14]. According to the results of another survey[15], serum levels of COMP have been correlated with rapidly progressing OA and remain significantly high in first 3 years of disease duration. All these findings suggest that serum COMP levels may be a useful assessment tool for OA. On the other hand COMP is particularly abundant in tendons, ligament and meniscus. Therefore increased concentrations can be related to injuries of these structures [16, 17]. Also serum concentrations vary by ethnicity, gender, age and exercise[18-20].

Type II Collagen Biomarkers:

Type II collagen is the most important protein of human cartilage and it is relatively specific for the hyaline cartilage. Because altering in articular cartilage turnover is the main pathology in OA, type II collagen has been investigated for a potential marker[21]. Type II collagen is composed of a triple helix of three identical alpha chains. It is firstly synthesised as a procollagen which is constituted by the collagen molecule itself that forms the framework of cartilage matrix and the N- (PIINP) and C-terminal (PIICP) propeptides at each end. These propeptides are clevead-off during the subsequent maturation stage and released into the biological fluids. Also there are alternative forms of procollagen that differ by the presence of a 69 aminoasid sequence in the N-propeptide. During the degradation process of type II collagen, different molecules are released in biological fluids. These include fragments of triple helix, collagenase neo-epitopes and C-terminal crosslinking telopeptides. Type II collagen biomarkers are summarised in Table 2.

Table 2: *Type II Collagen Biomarkers*[21]

Cleavage neoepitopes	C2C, C1,2C, TIINE, Coll2-1/4N1, Coll2-1/4N2
Denaturation epitopes	Coll2-1, Coll2-1/NO2, Helix-II, CB-11 (COL2-3/4m), AH8, AH9, AH12
Telopeptide epitopes	Col2CTx, CTX-II
Propeptide epitopes	CPII, PIIANP

C terminal crosslinking telopeptides (CTX-II) and Helix II are markers of collagen degradation. These two markers are believed to reflect different but complementary parts of cartilage degradation.While CTX-II is a fragment of C-telopeptides region, Helix-II is fragment of the helical domain of Type II collagen. Recent studies[22-24] have shown that urinary levels of CTX-II and Helix-II were significantly higher in patients

with OA compared with healthy controls. CTX-II were found to be associated with radiological progression in patients with knee and hip OA and this association is stronger in participants with joint pain[11,25]. Contrarily in another trial[26] CTX concentrations were correlated with radiologic progression but were not correlated with clinical status. High levels of urinary CTX-II are associated with rapid progressive disease[27,28]. Urinary levels of CTX-II is also reported to be linked to the efficacy of treatment in OA [29]. Levels of CTX-II and Helix-II are influenced from patients body mass index[23,30,] but there are conflicting data about relationship between age and urinary CTX levels [23,30].

N propeptide of type IIA procollagen (PIIANP) is one of the two splice forms of type-II procollagen. It is mainly expressed in embryonic cartilage and believed to re-expressed in osteo-arthritic cartilage[27,31]. Recent studies have shown that its combination with CTX-II could distinguish patients at high risk for rapidly progressive joint damage in OA. Because this two markers represent imbalance between cartilage synthesis (PIIANP) and degradation (CTX-II)[27,28]. Rousseau *et al*[32] found decreased levels of PIIANP in patients with knee OA and RA suggesting that type IIA collagen synthesis may be altered in these arthritic diseases. Sharif *et al*[28] assessed serum concentration of PIIANP and urinary concentration of CTX-II for five years in patients with mild-to-moderate knee OA.The authors observed that over the 5 -year study period average PIIANP and CTX-II levels were higher in patients with progressive disease. The risk of progression was highest in patents with 5 year levels of PIIANP in the highest quartile and/or CTX-II in the two highest quartiles [28]. Kumm *et al*[10] report that tendon calcification is associated with higher levels of PIIANP in men with early stage knee OA. The investigators conclude that males showed a tendency toward synthesis and females showed a tendency toward degradation, during early stages of the disease [10].

There are also promising type II collagen biochemical markers such as Type II collagenase neoepitopes (C2C, C1-2C, TIINE), Coll 2-1, Coll 2-1 NO2, CPII, CPIII which need further human studies. In a recent study Ishijima *et al*[33] suggest that cartilage turnover markers such as CTX-II, C2C, CPIII, bone resorption marker NTX and HA were all significantly increased in subjects with knee pain independent of grade. Coll 2-1 and Coll 2-1 NO2 levels tended to be associated with radiological progression of OA[34]. Deberg *et al*[35] demonstrated Coll 2-1 levels were decreased after total hip or knee arthroplasty. In contrast Coll 2-1 NO2 levels remained elevated. This finding suggest that Coll2-1 can be a useful disease specific marker for monitoring structural changes in a single joint [35]. CPII levels in synovial fluid was elevated in patients with OA compared with healthy subjects [36]. Also CPII levels found to be predictive of radiographic progression in early stage OA [37].

Glucosyl-Galactosyl-Pyridinoline (Glc-Gal-PYD):

Ürinary Glc-Gal-Pyd is a marker of synovial tissue turnover and reflects synovial matrix degradation. It has been shown to be associated with cartilage loss and radiographic knee OA [26,38]. Gineyts *et al*[39] designed a study that aimed to evaluate the effect of ibuprofen on CTX-II and Glc-Gal-Pyd levels in knee OA. At baseline urinary levels of CTX-II and Glc-Gal-Pyd were higher in patients with knee swelling. After 4-6 weeks of treatment, placebo group patients with knee effusion had significantly higher urinary CTX-II and Glc-Gal-Pyd concentrations, compared with ibuprofen group[39]. A trial which considered relation between markers and disease activity in patients with knee OA concludes that Gly-Gal-Pyd and CTX-II were the most important predictors of the WOMAC index and joint damage, respectively[26].

Hydroxyproline and Lysylpridinoline:

Hydroxyproline (HP) and lysylpridinoline (LP) are components of collagen. They are both derived from bone. HP is also derived from cartilage. Otterness *et al*[40] carried out a study in 39 patients with knee or hip OA. They investigate 14 molecular markers used to monitor OA. There was a strong correlation between urinary HP levels and baseline clinical status of the patients. However HP levels did not reflect the clinical changes after one year follow-up[40]. Thompson *et al*[41] have reported a correlation between radiological score and collagen crosslinks. In contrast Astbury *et al*[42] have found higher urinary levels of collagen cross-links in patients with OA compared with healthy controls, but no associations with radiological grades. Overall, collagen cross-links may be useful for understanding cartilage and bone destruction in OA.

Aggrecan Biomarkers:

Aggrecan is the major proteoglycan in the articular cartilage. Aggrecan markers are also studied as

potential molecular markers of cartilage turnover. There are variable reports about keratan sulphate (KS) depending on the antibodies used[43,44]. Interestingly, Nakajima *et al*[45] reported significant reduction in KS levels after arthroscopic surgery in patients with knee OA. Epitope 846 of chondroitin sulphate (CS) reflects proteoglycan synthesis. Studies found that serum levels of epitope 846 decreased in patients with OA [31]. Also serum hyaluronic acid (HA) is considered as a potential biomarker in OA. HA levels were shown to be increased in sera of patients with knee and hip OA and suggested to have a predictive value for further radiographic progression [26,46-49]. Matrix metalloproteinases (MMPs) are endopeptides that are capable of cartilage matrix degradation. MMPs levels reflect inflammation and predict joint erosion in rheumatoid arthritis. Similarly in the OA patients serum levels of MMP3 has been shown to be increased[50]. In a randomised prospective study nimesulide treatment reduced serum levels of MMP-3 and MMP-13 in patients with flare-up of OA[51]. In this study the decrease in levels of MMP-13 correlated significantly with the decrease in levels of CTX-II and HA. Endogenous inhibitors of MMPs are called as tissue inhibitors of matrix proteinases (TIMPs). Among entire types of TIMPs, TIMP-1 has the highest affinity for MMP-3 and MMP-13[52]. Chevalier *et al* [53] investigated serum levels of TIMP-1 and hyaluronic acid in hip OA. The authors found that serum levels of TIMP-1 is beneficial in discriminating slowly progressive disease from rapidly progressive one [53].

YKL-40:

YKL-40 (human cartilage glycoprotein-39) is a recently discovered human glycoprotein which is related to histopathological changes in synovium and cartilage. High levels of YKL-40 have been measured in serum and synovial fluid of patients with OA especially in later stages[54]. Zivanovic *et al* reported that YKL-40 concentration is correlated with the level of cartilage destruction and can be used for assessment of destruction.

Osteocalcin:

There have been a number of studies considering osteocalcin (OC) as a biomarker for OA. Joint space narrowing was significantly associated with serum OC level in patients with hand OA[55]. Higher OC levels were significantly correlated with decreased rate of cartilage loss and radiologic progression of knee OA[56,57]. In contrast Naito *et al*[58] demonstrate that OC levels are not elevated in patients with OA. Similarly Jung *et al*[59] found no relationship between serum OC concentrations and ultrasonographic findings of knee OA.

Inflammatory Biomarkers:

Although OA is commonly known as a non-inflammatory disease, markers that reflect inflammatory process also have been studied. Otterness *et al* investigated 14 serum and urine markers in an attempt to find association with particular clinical end points. Swelling of the joint was correlated with inflammation markers. CRP was the most highly correlated. Elevated levels of high sensitivity CRP predict cartilage loss in OA and poorer outco mes in knee arthroplasty[60, 61]. At the first year assessment the change in patient related clinical variables such as, patient self assessment, pain on weight bearing and stiffness was correlated with TGFβ1. In an animal study higher levels of synovial TGFβ1 predict the later development of more severe OA changes[62]. TNFα, receptor for advanced glycation endproducts (RAGE), IL-6, IL-1 are other assessed markers of inflammation for OA.

Adipokines:

Adipokines (adiponectin, leptin and nesfatin-1) are cytokines released from adipose tissue. They also secreted from osteoblasts, synoviocytes and chondrocytes and therefore thought to be linked to OA. Elevated levels of adiponectin leptin and nesfatin-1 were shown in synovial fluids of patients with OA. In addition, they found to be correlated with disease progression [63-66].

Conclusions:

There is an increasing interest in the use of biochemical markers in patients with OA, especially in order to predict disease progression and monitoring the treatment. Also new markers have been investigating to identify healthy individuals at high risk for the development of OA. The ESCEO working group have been identified avenues for future research in this field. According to their recommendation, further studies must be performed in order to reveal mechanisms of OA, development of new biomarkers, assays and technological development, prognosis and patients under risk of OA[3]. Although, there are promising candidate markers, none of them have been specifically recommended for clinical usage yet.

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Case Series

Musculoskeletal Ultrasound – The Physiatrists and Third Eye

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Abstract

The Department of PMR, AIIMS, New Delhi started using musculoskeletal ultrasound (US) 6 years back in 2009. The department has performed over 1615 US diagnostic examinations and more than 523 US guided interventions in last 20 months (from Nov 2013 to June 2015). Most of the diagnostic examination done on shoulder (n=762) followed by ankle (n=216), knee (n=173), Hip (n=170), elbow and forearm (n=158), wrist and hand (n=136). US guided interventions include joint, muscle, tenosynovitis, nerve blocks, bursae, ganglion, botulinum toxin injections etc. The current case series (six cases), 3 each of upper and lower limb demonstrates the fact that how availability of point of care ultrasound has helped in management of patients in PMR. This paper highlights the change in management of patients after performing outpatients clinic based ultrasound as it is very useful in diagnosis and intervention in musculoskeletal disorders. Ultrasound also helps in better patient education regarding the structural and dynamic impairment related to disease while doing the ultrasound itself and results in high patient satisfaction.

Key words: **Musculoskeletal ultrasound, management.**

Introduction:

The role of musculoskeletal ultrasound (MSK US) as a tool for investigating various diseases is not new in medicine. The use of diagnostic ultrasound in musculoskeletal system was adopted in Europe much before its use in the United States of America and other parts of the world. The use of musculoskeletal ultrasound in Physical Medicine and Rehabilitation (PMR) started picking up in last few decades. It is a useful adjunct to routine history and examination of the musculoskeletal system and adds third dimension to what we inspect, palpate, percuss and measure during the clinical examination. This additional advantage provided by ultrasound helps in confirmation of diagnosis, prevents unnecessary costly investigations, helps in better musculoskeletal training of medical students, makes them understand the value of surface marking and anatomy during clinical examination and helps in targeting better interventional physiatric procedures. Apart from the above advantages, another important factor is the high patient satisfaction seen while using the point of care musculoskeletal ultrasound.

Despite the availability of the technology, the only obstacle in MSK US use is the operator dependence to the extent that it's been said that "A fool with a stethoscope will be a fool with an ultrasound machine". The same analogy applies to the use of MSK US. Currently, no mentorship programmes exist in physical medicine and rehabilitation for MSK US and the only source of training is the MSK US workshops being arranged by the various academies and societies. Hence, the learning curve is steep and initial self-learning on oneself and normal volunteers along with cadaveric dissection and online image repositories is used.

The Department of PMR at our tertiary care centre started using MSK US 6 years ago. Initial phase was difficult and a lot of patience, persistence and devoted time went in to understand the machine and the anatomy as displayed in the image repositories. Since then, the department has come a long way. We have performed over 1615 MSK US diagnostic examinations and more than 523 US guided interventions in last 20 months (from Nov 2013 to June 2015) . Most of the diagnostic examination were done on shoulder (n =

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762) followed by ankle (n = 216), knee (n =173), hip (n =170), elbow and forearm (n =158), wrist and hand (n =136). Majority of US guided interventions included joint, muscle, peritendon areas, nerve blocks, bursa, ganglion, botulinum toxin injections etc.

While it is straightforward that the target is precisely reached under real time guidance in US imaging, there is still a debate about the usefulness and additional favourable impact of image guidance for patient treatment outcomes. The current case series highlights the advantage offered by skilful ultrasound in musculoskeletal condition diagnosis and the necessary changes in treatment protocols which translates into better patient outcomes and higher physiatrists' satisfaction.

The case studies are presented along with the discussion for the sake of conciseness and easy understanding

Case Study 1 :

History and Examination: A 33-year female, known case of rheumatoid arthritis on DMARD's presented with dull aching pain in right upper limb along with tingling and numbness of palmar aspect of hand. Initial rheumatology consult suspected cervical radiculopathy and carpal tunnel syndrome (CTS) due to mixed signs and inconclusive picture. There the patient was put on neuropathic pain medications (pregabalin 75mg twice daily) along with CTS splint. On reporting minimal relief after four weeks of therapy, patient was referred to PMR OPD.

Electrodiagnostic examination was advised after clinical examination. However, due to ease of office based availability of ultrasound in PMR a scan of the affected wrist was performed. US findings included a ganglion resting superomedial to flexor pollicis longus tendon, superior to index finger flexor tendon and adjacent to the median nerve. On complete extension of all fingers, the ganglion tunnelled inside the carpal tunnel and compressed the median nerve. Beautiful visualisation of findings was seen on dynamic US examination keeping the probe on distal radius, proximal carpal bones and doing alternate finger flexion and extension manoeuvre. The diagnosis of CTS was later confirmed by electrophysiological study (EPS).

MSK US Findings:

Carpal tunnel ganglion: Image at distal forearm (just proximal to wrist crease) showing ganglion (green), sitting above flexor tendon of index and middle finger displacing median nerve (yellow) medially. Flexor pollicis longus (FPL) is shown as obliquely oval hyperechoic structure (blue) (Figs 1a & 1b).

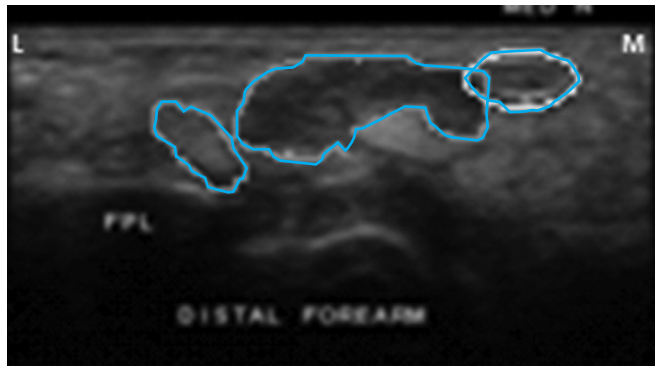

Fig 1a- Carpal Tunnel Ganglion: Image at Distal Forearm (Just Proximal to Wrist Crease) Showing Ganglion (Green), Sitting above Flexor Tendon of Index and Middle Finger Displacing Median Nerve (Yellow) Medially. Flexor Pollicis Longus (FPL) is Shown as Obliquely Oval Hyperechoic Structure (Blue). L-Lateral, M-Medial

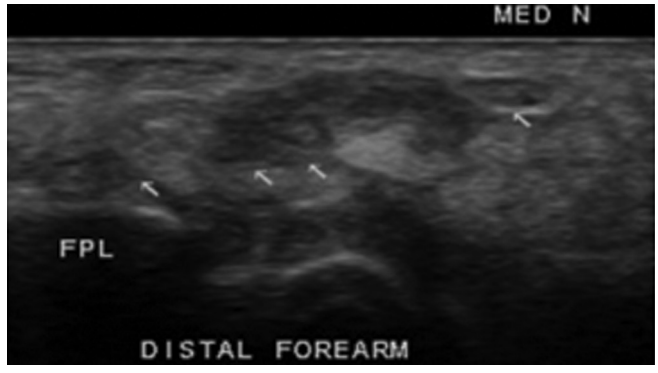

Fig 1b- Carpal Tunnel Ganglion: Similar Image as of Fig1a with Markings

MSK US Advantage

1) Early office based diagnosis
2) Confirmation of aetiology by dynamic examination
3) Precise location of ganglion with subsequent aspiration

Discussion: The EPS report of the patient showed increased right median nerve distal sensory (6.8ms) and motor latency (6.9ms) and decreased sensory conduction velocity (18). Ganglia are not so common soft tissue tumours in the wrist and compression of peripheral nerves by ganglia is unusual and only a few cases have been reported in the literature[1,2]. Earlier case reports of CTS evaluated by magnetic resonance

images have revealed an intra tunnel ganglion . In our case compression of median nerve by ganglion was a process visualised only on dynamic evaluation by high resolution MSK US, which would have not been possible with MRI. CTS splint (wrist hand orthosis in neutral position) was aggravating the pain as ganglion was tunnelling in the carpal tunnel on extension of fingers causing more compression. Benefits of MSK US in this case include office based early diagnosis, cost saving with no requirement of MRI and guided intervention not possible with MRI.

Case Study 2:

History and Examination: A 29-year right handed female housewife presented with history of insidious onset, gradually progressive deformity in right hand for last 2 months. On examination, we noticed partial clawing of right hand (ring and little fingers) and altered sensation in ulnar distribution but found no skin lesion anywhere in the body. B/L ulnar nerve were non-tender, not thickened with negative tinel sign at elbow. Mild swelling was noted on ulnar side of mid forearm which was hard to quantify as mild asymmetry of forearm thickness is usual in right handed persons.

MSK US of ulnar nerve at elbow and forearm was done which revealed a small hypoechoic cyst in middle part of flexor carpi ulnaris compressing the ulnar nerve. Thus structutal cause for partial hand clawing was found and treated accordingly.

MSK US findings:

Muscular cysticercosis: Forearm showing circular hypoechoic cyst with central hyperechoic part representing scolex (Fig 2a).

Muscular Cysticercosis: A cyst (circular hypoechoic

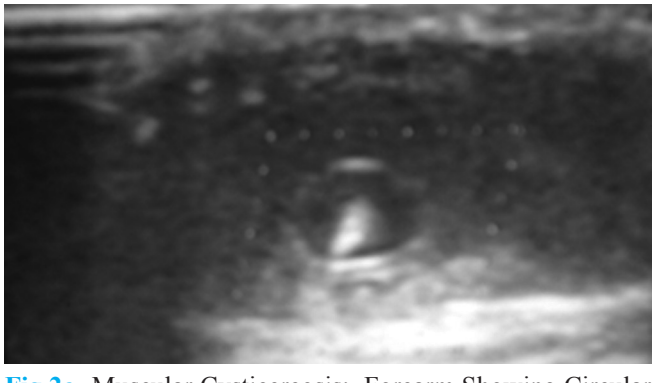

Fig 2a- Muscular Cysticercosis: Forearm Showing Circular Hypoechoic Cyst with Central Hyperechoic Part Representing Scolex of Cysticercosis

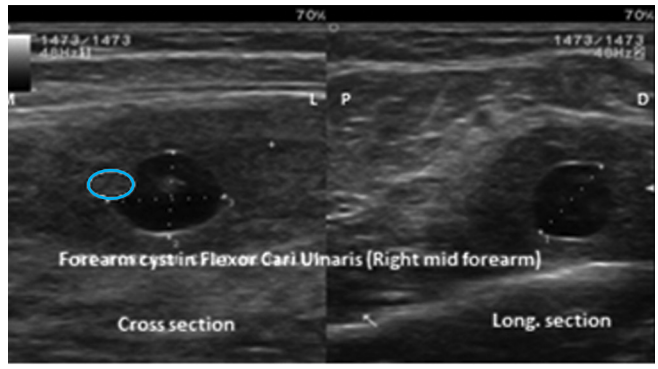

Fig 2b - Muscular Cysticercosis: A Cyst (Circular Hypoechoic Region) With Scolex (Inside Hyperechoic Dot Like Structure) in Flexor Carpi Ulnaris at Right Mid Forearm Level. Ulnar Nerve (Marked Yellow) Is Seen Just Adjacent to the Cyst.M-Medial, L-Lateral, P-Proximal, D-Distal.

region) with scolex (inside hyperechoic dot like structure) in flexor carpi ulnaris at right mid forearm level. Ulnar nerve (marked yellow) is seen just adjacent to the cyst (Fig 2b).

MSK US Advantage:

1) Early office based diagnosis of a structural lesion causing ulnar nerve compression.

2) Low cost burden to patient.

3) Prevention of inappropriate costly investigations as idiopathic ulnar nerve palsy and patient would have undergone numerous tests.

Management with USG –Structural compression of ulnar nerve, managed with albendazole 400 mg twice daily for 15 days and relief of symptoms.

Discussion: In the forearm, 3 distinct types of muscular cysticercosis have been described: the myalgic type; the mass like type, pseudotumour type, or abscess like type; and the rare pseudo hypertrophic type[3,4]. However, most cases of muscular and subcutaneous cysticercosis are asymptomatic[5,6]. Cysticercosis usually appears as an oval or round well-defined cystic lesion with an eccentric echogenic scolex in it. In our patient it was a bit central. For symptomatic solitary cysts outside the central nervous system, generally surgical resection is advocated. Ecysted larvae do not always result in clinical symptoms (as in this case main symptom was partial clawing of hand). For multiple or multilocular cyst or where surgery cannot be done, systemic therapy with antihelmintic drugs such as praziquantel and albendazole is advocated [7-9].

Case Study 3 :

History and Examination: A 72-year-old female came with pain and stiffness of right shoulder for 6 weeks. Pain was insidious in onset, with no history of trauma. No present or past history was suggestive of diabetes or rheumatologic condition. On examination, patient had mild to moderate restriction in shoulder abduction, flexion and external rotation suggestive of adhesive capsulitis of shoulder.

MSK US findings: Complete tear of right supraspinatus tendon with retracted tendon showing "naked tuberosity sign" (Fig 3a). On comparison with normal left side, we were surprised to visualize findings suggestive of supraspinatus tendinosis (thickening with mixed echogenicity both hypo and hyper) with small insertional bursal tear and intraarticular tear (Fig 3b).

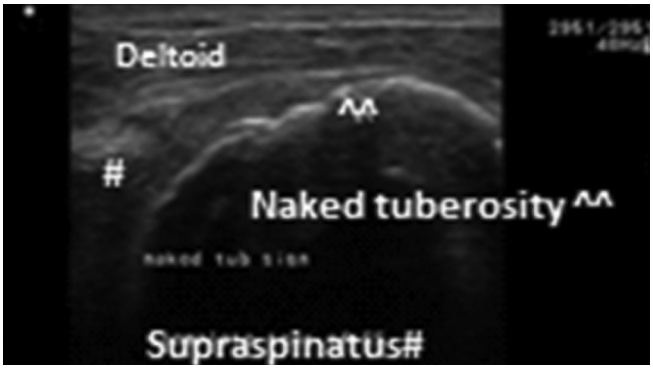

Fig 3a- Complete Supraspinatus Tear with Naked Tuberosity Sign: Symptomatic Shoulder (Right) Showing Supraspinatus Tear With Retraction of Fibres and Naked Tuberosity

Supraspinatus tear: Asymptomatic side (left) showing supraspinatus tear (bursal side and intra-articular side)

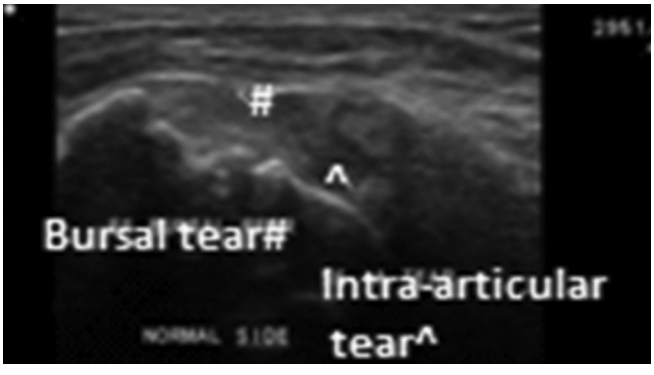

Fig 3b- Supraspinatus Tear: Asymptomatic Side (Left) Showing Supraspinatus Tear (Bursal Side and Intra Articular Side)

with naked tuberosity sign: Symptomatic shoulder (right) showing supraspinatus tear with retraction of fibres and naked tuberosity.

Management before MSK US: Patients was being managed as primary adhesive capsulitis of shoulder, with no relief in symptoms.

Management after MSK US: Considering that the left shoulder was completely asymptomatic, it didn't require any treatment other than preventive measures. We discussed the option of referring her for surgical repair of the right side but she was unwilling for any surgery considering her age and wanted to try conservative options. We prescribed a home based physical therapy programme focusing on isometric strengthening of shoulder abductors and rotators with a handout for preventive strategies' and movements to avoid. The value of MSK US in this case lies in early prediction of aetiology for adhesive capsulitis which subsequently resulted in change of the treatment protocol.

MSK US advantage: Formulation of conservative treatment protocol in accordance with aetiology for adhesive capsulitis resulting in better patient treatment outcome.

Discussion: This study enlightens the importance of clinical correlation with imaging modalities for proper management of the patient and how MSK US helps in patient education regarding one's condition. Diagnostic ultrasound is an excellent modality to incorporate into the overall evaluation of the musculoskeletal conditions of shoulder. Current options for this evaluation include arthrogram, CT arthrogram, MRI (with or without arthrogram), and ultrasonography .In a previous meta-analysis, De Jesus *et al*[10] compared and summarised the diagnostic accuracy of MRI and ultrasonography for rotator cuff tears. USG has sensitivity and specificity of 92.3% and 94.9% respectively for full thickness tear, 66.7 %and 93.5% respectively for partial thickness tears, 90.4% and 92% for overall tear, while MRI has sensitivity and specificity of 92.1 and 92.9 respectively for full thickness tear, 63.6 and 91.7 respectively for partial thickness tear, 85.5 and 85.1 for overall tear .

Case Study 4:

History and Examination: A 30 -years old, overweight female presented with insidious onset, dull achy, constant lower backache of around one year duration, radiating to left buttocks and occasionally to the left thigh. Activity made it worse and sometimes even rolling in bed resulted in severe pain. She had visited

multiple physicians including orthopedicians and neurologists but nothing specific was diagnosed and she was managed as degenerative disc disease secondary to old disc herniation. Her examination revealed pain in both flexion as well as extension. Straight leg raising test on left was 60º and that on right was 80º with no neurological deficit. We noticed a small nodular swelling just below her left posterosuperior iliac spine (PSIS) region which she mentioned as the single most tender point. X-ray sacroiliac joint (SIJ) was normal

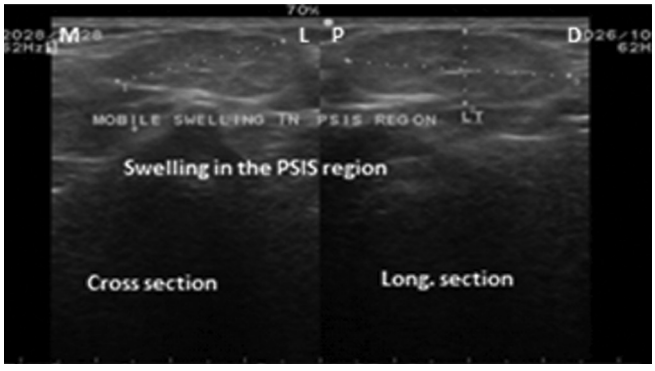

Fig 4- Episacral Lipoma: Showing as Isoechoic Oval Mass over Posterior Superior Iliac Spine Region

and x-ray and MRI LS spine showed findings consistent with degenerative disc and degenerative joint disease. With additional findings suggestive of posterocentral disc protrusions at L5-S1 level.

MSK US findings: An oval, well localised, homogenous echoic mass (most likely episacral lipoma) with no flow on color Doppler, sitting above left sacroiliac joint measuring 2.9×2.3×1.2 cm.

Episacral lipoma: showing as isoechoic oval mass over Posterior Superior iliac spine region (Fig 4).

Management before MSK US –Patient was managed as a case of disc herniation on neuropathic medication, exercises, and heat modalities with mild relief. She also received epidural caudal steroid injection and continuing exercises but had only minimal relief.

Management after MSK US – Infiltration of steroid and local anaesthetic provided significant relief in patient's overall conditions. After that, her compliance with conservative treatment (medications and exercises) greatly improved with near total subsidence of pain.

Discussion: Episacral lipoma (commonly called black mouse or herniated fat pad) is a treatable cause of either acute and chronic low back pain or lumbosacral radiculopathy as already described in literature for last 60-70 years. The usual aetiology is tears in the thoracodorsal fascia and subsequent herniation of a portion of the underlying dorsal fat pad through the tear. Medication and physical therapy may not be effective. Local injection of the nodule with a solution of anaesthetic and steroid is effective in treating the episacral lipoma pain for several months (18months) . We also managed our patient accordingly and patient reported complete resolution of her symptoms. The patient remained pain-free till the last follow-up six months after the injection.

Case Study 5:

History and Examination: A 38 years old female with complaints of non-traumatic right knee pain of 6 months duration, with heaviness and difficuty in walking for long distance reported in the OPD. On clinical examination, no abnormal swelling of the anterior and posterior knee region including suprapatellar and popliteal area, no joint line tenderness, no crepitation, no increase in temperature, and no tests suggestive of pathological ligamentous laxity. X-ray of bilateral knees was unremarkable. Blood investigations ruled out any primary or secondary arthritic conditions like rheumatoid arthrits or systemic lupus erthematous etc. Patient was diagnosed with early knee degenerative osteo-arthritis with patellofemoral pain symptoms and was already on collagen sachets and quadriceps strengthening exercises. She also took sessions of physical modalities but reported no relief.

MSK US findings: A hypoechoic mass was detected between medial gastrocnemius and semimembranosus with no flow in colour Doppler, communicating with posterior joint recess (many times difficult to demonstrate) diagnostic of Baker's cyst (Figs 5a and 5b). No other abnormality in knee muscles, patellar tendon, collateral ligaments, menisci and suprapatellar pouch was noticed.

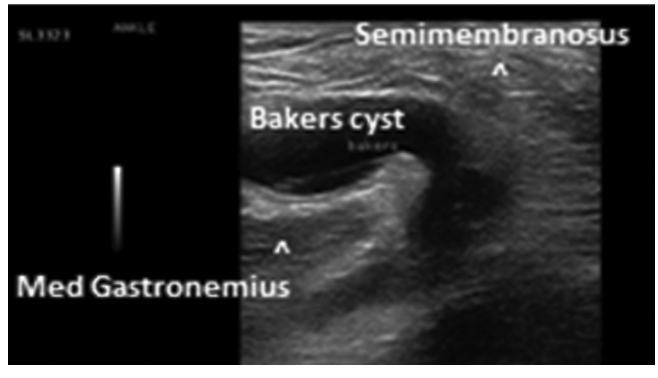

Fig 5a- Baker's Cyst in Cross Section: Hypechoic Lesion Lying between Medial Head of Gastronemius and Semi - Membranosus.

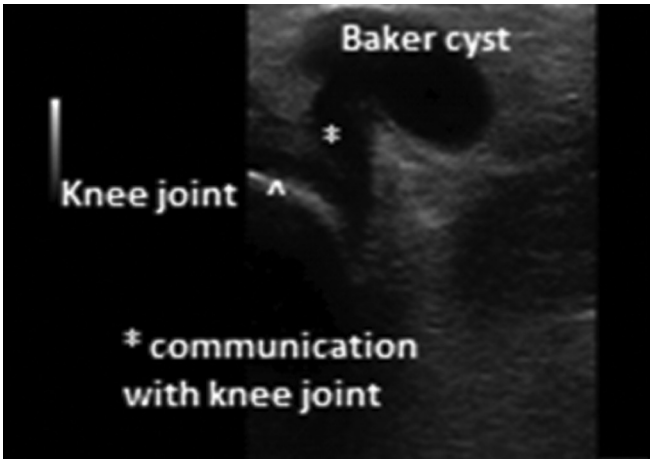

Fig 5b- Baker's Cyst Showing Communication with Knee Joint

Baker's cyst in cross section: Hypechoic lesion lying between medial head of gastronemius and semimembranosus.

Baker's cyst showing communication with knee joint.

Management before USG: Early degenerative knee osteo-arthritis with patellofemoral pain managed with conservative treatment, with minimal relief in symptoms

MSK US advantage: Diagnosis of actual patients structural location and size of baker's cyst. Therapeutic aspiration of 17 ml fluid under real time USG guidance with complete relief of symptoms. Here one may confidently say MSK USG is easy, cheap, reliable and dynamic assessment which helped not only in OPD diagnosis but also in instant treatment.Thus in single OPD visit provided both diagnosis and definitive management.

Discussion: Communication between the posterior knee joint and the medial gastrocnemius- semimembranosus bursa has been shown to increase with age, possibly because of degenerative thinning of the joint capsule and internal micro-derangements. The gastrocnemius - semimembranosus bursa is a composite of two bursae. The subgastrocnemius bursa between the medial gastrocnemius tendon and medial femoral condyle is the point of communication with the posterior joint capsule. The posterior extension of a Baker's cyst represents the second bursa between the medial gastrocnemius tendon and semimembranosus tendon that commonly communicates with the subgastrocnemius bursa. In a study by Ward *et al*[11] they compared Baker's cysts in MRI and USG and found that 59% anechoic, 23% hypoechoic, and 18% showed mixed echogenicity relative to muscle in ultrasound. Anechoic cystic structure was associated with 100% specificity and 100% positive predictive value in the diagnosis of Baker's cyst *versus* any other mass.

Case Study 6:

History and Examination: An 8 years child with spastic quadriparetic cerebral palsy presented with complaints of constant throbbing pain in posterior thigh, with mild swelling and redness of the region. No history suggestive of inciting traumatic event was present. On detailed history, the child reported initiation of pain after undergoing routine physical therapy at school. On examination there was noticable diffuse swelling of back of thigh raising the suspicion of hamstring strain.

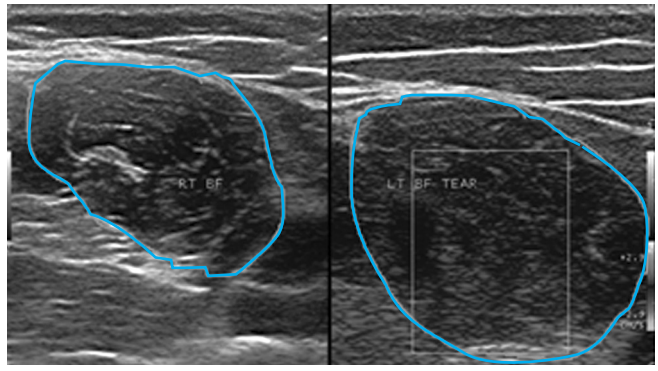

Fig 6a- Biceps Femoris Muscle: In Cross Section Showing Normal (Left) and Right Image Showings Overall Decreased Echogenicity with Hypoechoic Area (Fluid/Haematoma) Suggestive of Partial Tear

MSK US findings: Suggestive of acute muscle tear in proximal part of both medial and lateral hamstrings. Additionaly, complete tear of tendon of adductor longus with hypoechoic fluid(?blood) and retracted distal fibres were visualised.

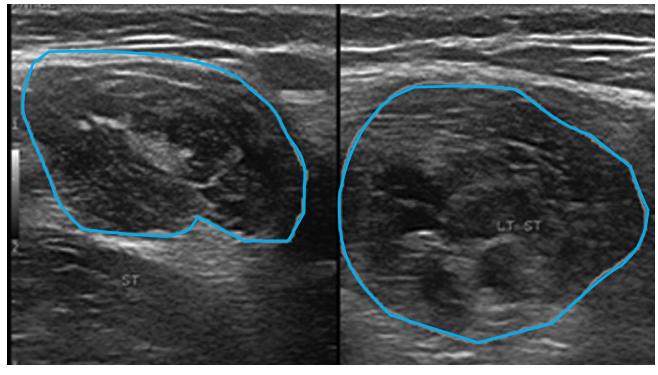

Fig 6b- Semitendinosus Muscle: In Cross Section Showing Normal (Left) and Partial Tear (Right Image)

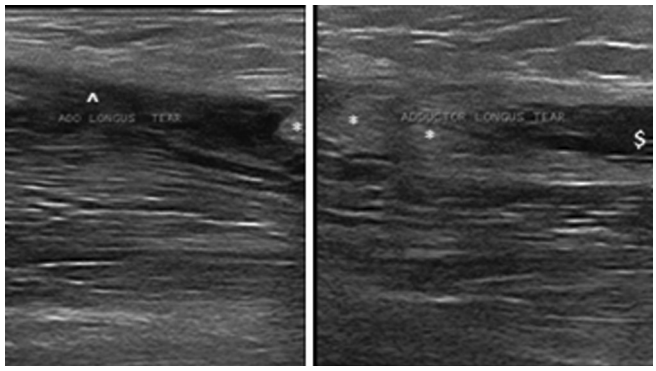

Fig 6c- Adductor Longus Tear: In Longitudinal Section ^Hypogenic Area Showing Tear *Retracted and Fibrosed Fibres of Adductor Longus $ Normal Adductor Longus Distally

Biceps femoris muscle (Fig 6a): In cross section showing normal (left) and right image showings overall decreased echogenicity with hypoechoic area (fluid/ haematoma) suggestive of partial tear.

Semitendinosus muscle (Fig 6b): In cross section showing normal (left) and partial tear (right image).

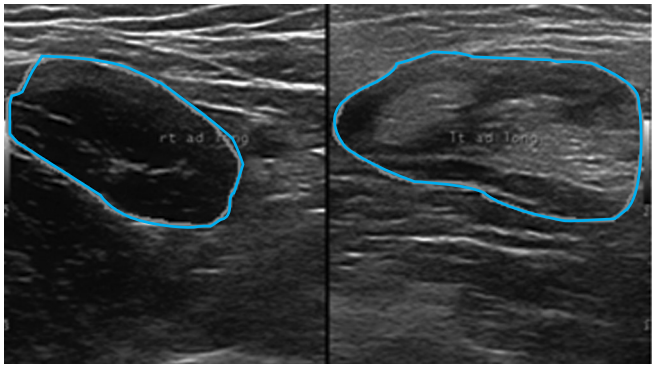

Fig 6d- Adductor Longus Tear: In Cross Section Showing Normal Side and Abnormal Side with Retracted Fibres (Right Image).

Adductor longus tear: In longitudinal section hypogenic area showing tear *retracted and fibrosed fibres of adductor longus $ normal adductor longus distally (Fig 6c).

Adductor longus tear (Fig 6d): In cross section showing normal side and abnormal side with retracted fibres (right image).

Management before MSK US: Differential diagnosis - Cellulitis, heterotropic ossification, deep vein thrombosis.

Management after MSK US: Complete rest for child with a brace and PRICE therapy. Gradual restart of gentle ROM and strengthening started after 8 weeks of rest.

Discussion: MR imaging is valuable when the global assessment of a joint requires evaluation of the muscles, tendons, cartilage, and bone marrow. Ultrasound, however, can produce similar results when a focused evaluation of muscle, tendon, and joint recesses is needed. MSK US can be used more frequently at a lower cost and with less delay when compared with MR imaging. Dynamic imaging is very helpful when differentiating full-thickness from partial-thickness tendon tears because tendon retraction indicates full-thickness tear. Although MRI is regarded as the gold standard , ultrasound examination enables identification of typical lesions of muscle strains: discontinuity of tertiary bundles, reactive oedema and haematoma. Ultrasound done after 48–72 hours reveals the evolution of the haematoma and the extent of the area affected . In cases of complete tears of the muscle belly, the retracted muscle bundles have the typical ultrasound appearance of a bell clapper surrounded by a hypoechoic haematoma . Recently Chen *et al*[12] also advocated the use of ultrasound for diagnosing adductor tears . Ultrasound as useful as MRI in depicting acute hamstring injuries and, because of lower costs, may be the preferred imaging technique .

Conclusions:

To summarise, we may conclude that MSK US guided interventions have a significant place and impact on future physical medicine and rehabilitation practice. The integration of point of care ultrasound into routine clinical practice helps in more efficient diagnosis and management in day to day practice. This case series depicts the value of MSK US in diagnosis and management of various musculoskeletal conditions in the routine OPDs and avoidance of extra cost due to time and money consuming added investigations like MRI etc. Further there is the added advantage of taking clinical management decisions in a timely manner at an office based setting. This saves a lot of time, money and energy of the patient and the physiatrist. Further, explaining to the patient during the scan makes him feel involved and helps in building doctor patient repertoire and high level of patient trust and satisfaction. Hence MSK US appears to be more cost effective and resource productive method of management.

However, the only limiting fact in its full exploitation is the steep learning curve and the pursuance of learning newer skills as it is evident that the musculoskeletal system is varied and the appearance in US is more dependent on understanding of anatomy at a particular site and does not follow a standard appearance. Further to this is the fact that there are limited learning avenues for the skill development and upgradation in MSK US in the field of physiatry. Till now, there was very limited interest in MSK US in radiologists as it was considered very low tech and less rewarding and time consuming learning process. Its integration into daily routine practice of physiatry by the next generation of practising physiatrists shall be helpful in making it more acceptable and useful mode of management. This needs to be followed up with continuing CMEs and online learning tools for constant updation of knowledge and skills. Last but not least, further analysis concerning their value and patient outcomes need to be established and validated.

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Case Report

A Sporadic Case of Ectrodactyly, Ectodermal Dysplasia, Clefting Syndrome in a 5 Years Old Male Child

Jaydeep Nandi[1], Prof. Ambar Ballav[2], Abhishek Biswas[3]

Abstract

Background: EEC syndrome comprises ectrodactyly, ectodermal dysplasia and facial clefting.
Case characteristics: A 5 years old male child presenteds with ankle and toe pain. He had absence of 2nd toes in feet, had cleft lip, cleft palate, conductive hearing loss and nasolacrimal duct blockage.
Intervention: Skin biopsy suggested ectodermal dysplasia thus completing the triad of EEC syndrome. Shoe modification with toe filler was prescribed.
Outcome: Ankle pain was relieved. Parents became more confident after diagnosis and prognosis were explained.
Message: A proper diagnosis helps in searching for other hidden problems as well as in confident management of the disease.

Key words: **Ectodermal dysplasia, ectrodactyly, ectodermal dysplasia, clefting syndrome, split hand–split foot malformation, transcription factor tp63.**

Introduction:

Ectodermal dysplasia (ED) is a group of heritable disorders where involvement could be seen in more than one ectodermal derivatives including the hair, teeth, nails, skin and exocrine glands. More than 170 distinctive syndromes exist with all possible modes of inheritance pattern. The most common syndromes among them are hypohidrotic ED and hidrotic ED. Several ED syndromes may coexist with midfacial defects, mainly cleft lip and palate[1]. Ectrodactyly is another feature which may be seen in association with ED.

Ectrodactyly or split hand–split foot malformation (SHFM) involves the absence of one or more central digits of the hand or foot and may even have syndactyly of the remaining digits[2]. Though the unique mix of Ectrodactyly, ectodermal dysplasia and cleft lip or palate was first described by Cockayne in 1936 but the acronym EEC syndrome was first used by Rudiger *et al* in 1970[3]. Most cases of EEC syndrome demonstrate mutations of the tp63 gene and are either new (spontaneous) mutations or are inherited as autosomal dominant disorders.

It is interesting to note at this point that there are at least four other syndromes caused by mutations of the tp63 gene including ankyloblepheron-ED-cleft (AEC)/Hay-Wells syndrome, Rapp-Hodgkin syndrome (RHS), limb-mammary syndrome (LMS), and acro-dermato-ungual-lacrimal-tooth (ADULT) syndrome. In addition, tp63 mutations have also been associated with several non-syndromic split hand/foot malformations and non-syndromic cleft lip/palate[4].

The transcription factor tp63 have such a close association with EEC syndrome because of its regulatory action on ectodermal, orofacial and limb development. This fact was established in 1999 by the generation of tp63 knockout mice who clearly lacked all squamous epithelia and their derivatives including hair, whiskers, teeth, as well as the mammary, lacrimal, and salivary glands. Also those hapless mice's had severe limb truncations characterised by complete absence of the phalanges plus carpals and variable defects of ulnae plus radiae[5].

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Case Report:

A 5-year-old male child, born from healthy non-consanguineous parents, was referred to our department for bilateral persistent ankle pain suspected to be a case of dislocation of talotibial and talocalcaneal joint (Fig1) after a trivial left ankle sprain. But during patient observation, his cleft lip and feet deformity aroused our attention.

According to the parents, he did not have any medical problem and was not on any medication. No other family member had similar features. He was delivered by caesarean section and had a birth weight of 3 kg. At birth the child was observed to have multiple congenital anomalies namely bilateral complete cleft lip, cleft palate (Fig2) and absence of 2nd toes in both feet along with fusion of 3rd and 4th toes (Fig3). Repair of bilateral cleft lip was done at the age of 3 months and palatoplasty operation done at 10 months. Next phase of lip and palatal repair, i.e., refashioning of central lip defect and augmentation of pre-maxilla is pending. Till then the patient is using maxillary bite plate. His personal history showed that he takes mixed diet and had received up to date immunisation.

As the child grew few other deformities became apparent. Parents noticed squinting and watering of both eyes associated with itching. The child was diagnosed with alternate divergent squint (due to refractive error) and congenital dacrocystitis (due to bilateral nasolacrimal duct blockage). Eyes became straight with bilateral refractive correction of +1.5 Dsph while digital massaging and antibiotic eye drops were prescribed for the time being to combat the dacrocystitis component with future plan of bilateral dacrocystorhinostomy (DCR) operation for NLD blockage.

Another problem noticed by the parents were dental malocclusion and multiple caries involving mainly the upper row (Fig4). Treatment including temporary cemented maxillary bite plate and other phased procedures are going on from a private dental college. Hearing defect was also present but took somewhat more time to recognise in the child. Audiological evaluation (clinical examination plus audiogram and tympanogram) revealed adenoid hypertrophy and mild conductive hearing loss of 35-40 dB due to bilateral otitis media with effusion but intact tympanic membrane. Since the sensory neural reserve was found to be normal on BERA examination, management of the conductive loss is being tried with mucolytic and nasal decongestant.

As has been apparent on first presentation a diagnosis of ectrodactyly-ectodermal dysplasia-clefting syndrome was made based on the presence of split toes, dental malocclusion, cleft lip and cleft palate. Further clinical examination revealed a total nail dystrophy, characterised by a slow growth, yellowing and eroded distal part, white transverse ridges and thinning (Fig5). His skin appeared dry and ichthyosiform (Fig6); further, he complained of decreased sweating and heat intolerance, suggestive of hypohidrosis. Also the skin and hair appeared hypopigmented with sparse eyebrows (Fig7). Skin biopsy from forearm shows epidermis with hyperkeratosis and mild acanthosis. The sebaceous glands were absent in the dermis while the hair follicles and eccrine glands are found to be rudimentary. Overall the histopathology features were compatible with ectodermal dysplasia.

Physical examination of both feet showed ectrodactyly and syndactyly. X-ray of feet revealed the absence of some dactylic segments and the fusion of others (Fig8). An abdominal and genitourinary ultrasonography ruled out the possibility of other organ involvement. Chromosomal analysis revealed normal male chromosomal pattern of 46 XY but the specific test for tp63 mutation could not be arranged. Thyroid profile and serum cortisol level were within normal limits but oestradiol level (< 10 pg/ml) is slightly below normal (11-44 pg/ml). Also peripheral blood film and routine haematological examination could not detect any gross abnormality. The patient had a normal IQ and intellectual development albeit somewhat hyperkinetic. No other family members were known to be affected by this disease. Based on all of the above findings, a diagnosis of sporadic ectrodactyly-ectodermal dysplasia-clefting syndrome was confirmed in our case.

Management:

Orthopaedic and rehabilitation evaluation ruled out any significant dislocation of talotibial and talocalcaneal joint and modified shoe was provided to the patient. The shoe modifications include soft heel, firm heel counter and soft ‘filler’ in between 1st and 3rd toes bilaterally. Also a course of NSAID (ibuprofen) and contrast bath was given in the initial acute phase of ankle pain and when the pain subsided he was encouraged to do bilateral ankle dorsiflexor, plantar flexor, evertor and invertor progressive resistive strengthening exercises. The patient remained asymptomatic during the entire follow-up period of 6 months.

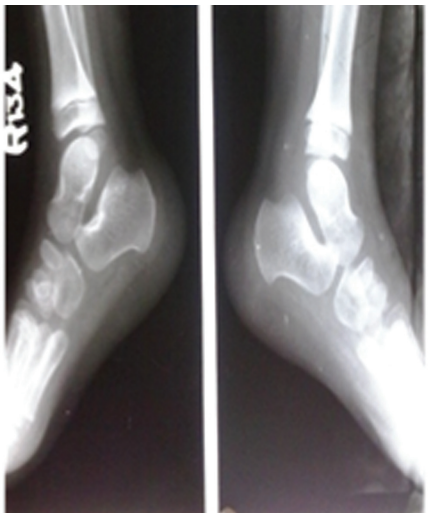

Fig 1- X-ray Showing Bilateral Dislocation of Talo-tibial and Talo-calcaneal Joint

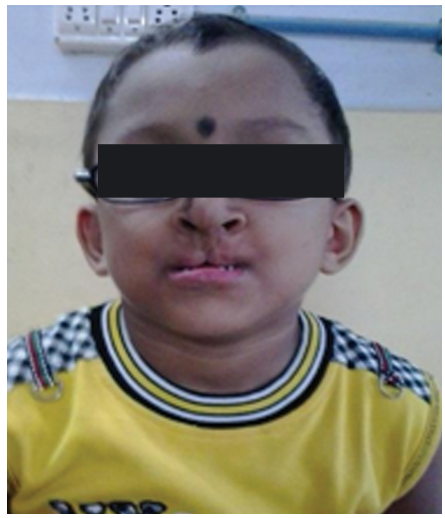

Fig 2- Five -Year Old Male Child with Cleft Lip and Sparse Hair

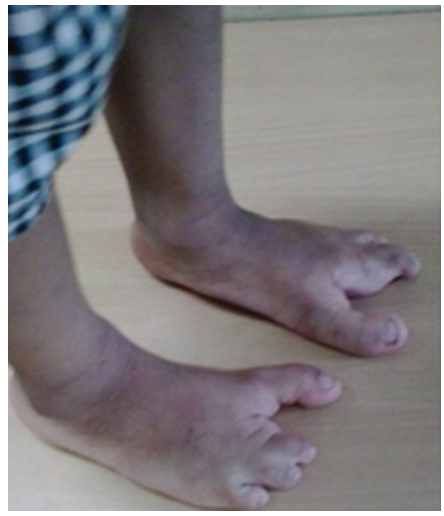

Fig 3- Absence of 2nd Toes in Both Feet with Deep 'v' cleft and Fusion of 3rd and 4th Toes

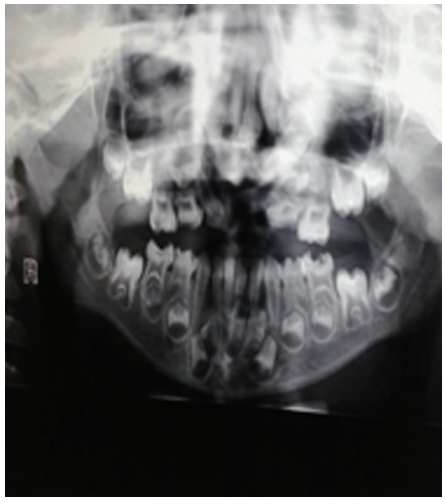

Fig 4- Orthopantomogram Showing Multiple Caries and Malformed Dental Eruptions Mostly on the Upper Row

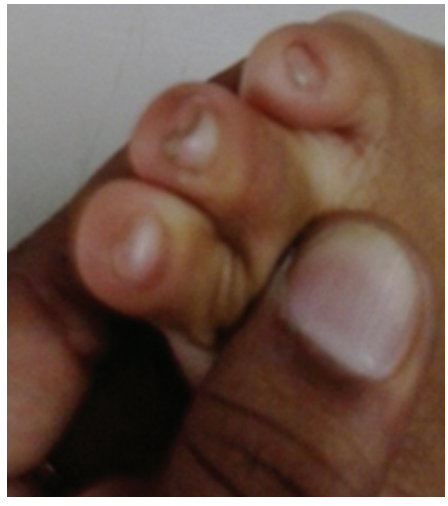

Fig 5- Nail Dystrophy, Characterised By Eroded Distal Part, White Transverse Ridges and Thinning

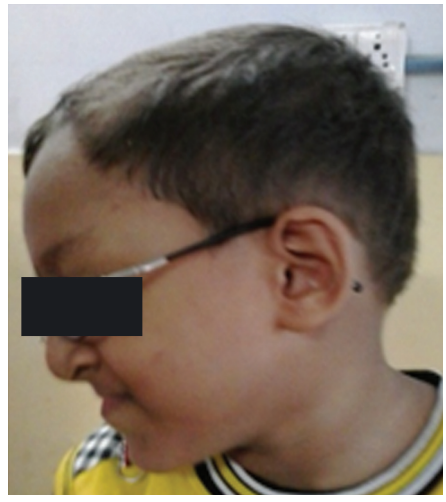

Fig 6- Dry and Ichthyosiform Skin along with Hypopigmentation of Hair

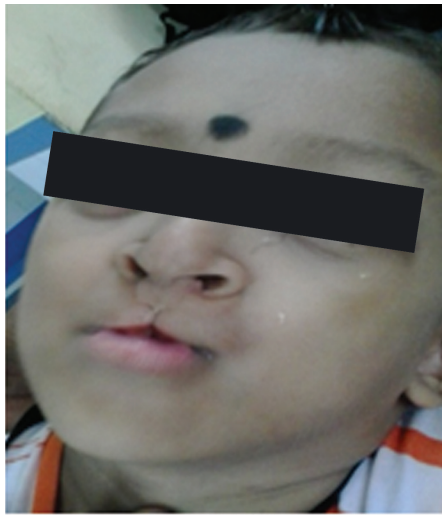

Fig 7- Hypopigmented and Sparse Eyebrows

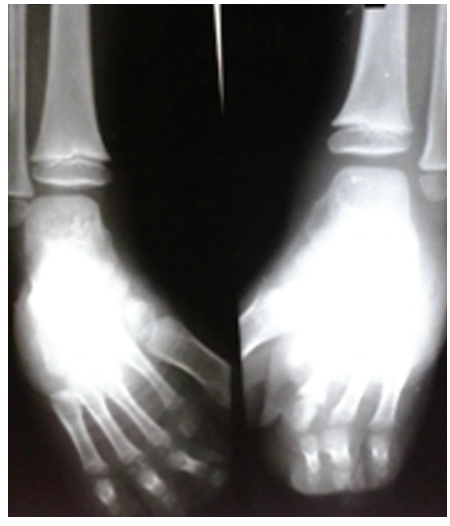

Fig 8- X ray Revealing Absence of Some Dactylic Segments and the Fusion of Others

Since the management of EEC syndrome is multidisciplinary, the parents were guided to prioritise dental, eye and especially ENT treatment. Keeping his heat intolerance and hypohidrosis in view, he was suggested to stay in cold and moist environment only and avoid excessive and strenuous physical activities. Extensive investigations ruled out any other serious concerns like endocrinal abnormality or genitourinary problems at present. The parents are now more confident in managing their child's disease as they have the diagnosis and prognosis explained to them.

Discussion:

Thurnam published the first report of a patient with ED in 1848, but the term "ectodermal dysplasia" was officially coined by Weech in 1929 [6,7].The condition occurs in approximately 1 in every 100,000 live births[8]. The first classification system for EDs was devised by Pinheiro and Freire-Maia in 1982[9]. Pure ectodermal dysplasia is characterised by only ectodermal signs; but if it combines ectodermal signs and malformations, the terminology changes to ectodermal dysplasia malformation syndrome or an ED syndrome [10]. The present case belongs to ED syndrome category.

Likewise the individual frequency of ectrodactyly is reported to be 1.5 per 100,000 live births and that for cleft palate with or without cleft lip is 1 per 100,000 live births [11].The term ectrodactyly denotes congenital absence of all or part of one or more fingers or toes while syndactyly signifies fused or webbed fingers or toes[12]. In comparison a permanent deflection of one or more fingers is referred to as clinodactyly[13].

The occurrence of all three disorders in one, i.e., ectrodactyly, ED, and cleft lip/ palate is reported to be approximately 1.5 per 100 million[3]. More than 300 cases have been described in the literature[14]. EEC syndrome is a rare congenital syndrome with autosomal dominant inheritance and incomplete penetrance, characterised by a highly variable clinical expression[15,16]. Sporadic forms like in our case are very rare and generally the most severe[12].

EEC syndrome consists of ectrodactyly (E), ectodermal dysplasia (E) and cleft lip (C) with or without cleft palate[17]. The ectodermal component of ED can involve skin (hyperkeratosis, hypopigmentation and atrophy) hair (hypotrichosis and hypopigmentation), teeth (hypodontia, microdontia and enamel dysplasia), nails (dystrophic in most case) and exocrine glands (reduction or absence of sweat, sebaceous and salivary gland)[18]. In addition to the 3 cardinal features of the EEC syndrome, other manifestations are often reported like nasolacrimal duct anomalies, photophobia, corneal ulceration, urogenital malformations, mammary gland or nipple anomalies, choanal atresia, comedo or white sponge nevus, ear anomalies, conductive hearing loss, hypopituitarism and growth hormone deficiency[19].

The tp63 gene contains codes for synthesizing a protein that is necessary for the proper development of the limbs and structures derived from the ectoderm. Mutations of this gene lead to a reduction of functional levels of p63 protein, which hampers the proper development of these structures. Investigators have determined that the tp63 gene is located on the long arm (q) of chromosome 3 (3q27)[20]. EEC syndrome caused by mutations of the tp63 gene located in chromosome 3 is sometimes referred to EEC syndrome type 3 (EEC3). But rarely when it is caused by chromosomal abnormalities of chromosome 7(7q11.2-q21.3) it is referred to as EEC syndrome type 1 (EEC1). A disorder formerly designated as EEC syndrome type 2 no longer exists[21].

Genetic counselling should be offered to affected families informing them that the risk of passing the abnormal gene from affected parent to offspring is 50% for each pregnancy regardless of the sex of the resulting child. Due to germline mosaicism, unaffected parents of a child with EEC syndrome have a 4% risk of having another affected child[22].

Management is multidisciplinary and requires evaluation by orthopaedic, physical medicine and rehabilitation specialist, plastic and dental surgeons, ophthalmologists, dermatologists, and speech therapists. Prognosis is good with a near to normal life expectancy. Hypohidrosis (reduction/absence of sweat glands) presents the most life-threatening complication, as it can cause seizures and coma when inadequately managed[14].

For the sufferer his/her life revolves around the exceptional clinical variability of EEC syndrome even though the clinician may feel it is a rare disease to deserve attention. Hence, we have described this rare, symptomatic and sporadic case to confirm the unpredictable expressivity of EEC syndrome with a firm belief that a proper diagnosis helps in searching for other hidden problems as well as in confident management of the disease.

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REHAB CHALLENGE

9yr old child resident of Bangladesh presented to PMR OPD with c/o dull aching pain over left lower limb for last 6 months associated with difficulty in walking and limping gait. The difficulty in walking was first noticed by his parents at the age of 5 years. The condition was gradually progressive in nature. The boy was otherwise normal. There was no h/o developmental delay or speech impairment. There was no dental defect. No h/o trauma, visual impairment or hearing loss. On Inspection: - No facial asymmetry, café au lait macules + over trunk & B/L lower limb, swelling & flexion deformity at the left knee .No muscle atrophy noted. On Palpation:-tenderness over the left lower limb (hip, thigh, leg, ankle). Gross power-B/L U/L-5/5.Rt L/L-5/5.Left L/L-5/5 .Sensory-All 4 limbs 2/2.Restricted ROM of left L/L. there was tightness of skin of all limbs , more in the lower limbs. All blood examinations were normal. X- Ray showed expansion of the bone associated with sclerosis of striated pattern noted in the diaphysis, metaphysis, epiphysis of left pelvis, thigh & leg. No evidence of fracture, dislocation is seen. He was diagnosed as Osteopathia Straita.

He was prescribed excercises and orthosis of knee.

Please opine regarding further management of the child.

Fig 1

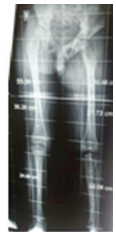

Fig 2

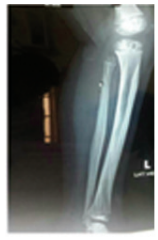

Fig 3

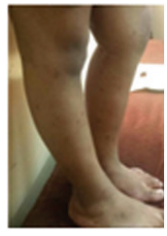

Fig 4

Medical Philately

Issued by Canada on Sep. 14, 2009

Title	Mental Health
Denomination	P + 10¢
Date of Issue	September 14, 2009
Postal Administration	Canada
Perforation or Dimension	Simulated perforation = Dentelure simulée
Printer	Lowe-Martin Company Inc..
Creators	Design / Illustration: John Belisle (Signals Design Group). Design: Kosta Tsetsekas (Signals Design Group).
About Stamp	Did you know that one in five Canadians will suffer from a mental illness at some point in their lives? Unfortunately, despite its far-reaching scope, this issue is too often overlooked and stigmatized. In fact, it is so commonly kept hidden that it's been called the "Invisible Disease. The stamp, which features natural scenery flowing through the outline of a human figure, was designed by Vancouver's Signals Design Group. A tree was chosen as the stamp's central element because it symbolizes health, growth and maturity, all attainable for people affected by mental illness. The shape of the tree refers subtly to the human brain, while the path progresses towards better health and a fulfilled life.
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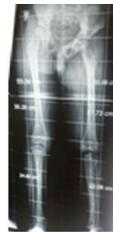
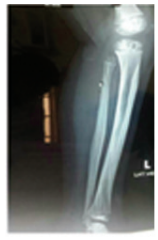


Fig 2



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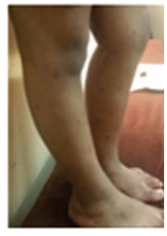

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REHAB QUIZ

1. **During which phase of throwing is the elbow joint placed under the most valgus stress?**
   a) Follow through
   b) Wind up
   c) Early cocking
   d) Late cocking

2. **Which of the following does the nerve conduction component of the neurodiagnostic study fail to assess or give information about?**
   a) Autonomic nerve
   b) Integrity of myelin
   c) Sensory nerve
   d) Speed of transmission

3. **The X axis of oscilloscope (screen) represents.**
   a) Time in microseconds
   b) Time in milliseconds
   c) Distance in centimetres
   d) Distance in millimetres

4. **As opposed to acquired neuropathies, congenital neuropathies usually.**
   a) Have proximal more than distal slowing
   b) Have uniform slowing throughout the nerve
   c) Have segmental slowing throughout the nerve
   d Are distal

5. **Monopolar needles generally have higher amplitude motor that action potential (MUAPS) than concentric needles because.**
   a) Monopolar needles are longer than concentric needles
   b) The needles samples from 360 degree rather than 180 degree
   c) The tip of a concentric needle is smaller
   d) Concentric needles have the ground electrode as part of the needle

6. **All of the following are true about piriformis syndrome except**
   a) The sciatic nerve may be involved because in some individual the nerve releases through piriformis muscle
   b) Pain may be in lat buttock, post hip to thigh, sciatica like pain
   c) Pain in flexion, abduction, external rotation
   d) Pain may be exacerbated by walking upstairs or prolong sitting

7. **What is terrible triad?**
   a) Medial/lateral meniscal injury with anterior cruciate ligament(ACL) tear
   b) ACL, medial collateral ligament(MCL),and medial meniscus injury
   c) ACL, post cruciate ligament(PCL),and lat meniscal injury
   d) ACL , MCL , and PCL

8. **Mallet finger is.**
   a) A rupture of terminal extensor tendon of distal phalanx
   b) Identified by loss of active extension of proximal interphalangeal joint(PIP) of finger
   c) Caused by forced extension of distal phalangeal joint
   d) Occurs more commonly in ice hockey than in baseball or basketball

9. **Little league elbow.**
   a) Involves the lateral elbow region
   b) Is an acute dislocation of elbow
   c) Occurs most commonly b/w ages 3-15
   d) Occurs in athletes complaining of medial elbow pain

10. **An injury involving the centre of optic chiasm would result in.**
    a) Homonymus hemianopia
    b) Bitemporal hemianopia
    c) Cortical blindness
    d) Monoocular blindness

ANSWERS

Answer of December 2016

1a, 2c, 3c, 4a, 5c, 6b, 7a, 8d, 9a, 10b

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BOOK NEWS

1. Neurorehabilitation Technology2nd ed, by David J. Reinkensmeyer and Volker Dietz. Publisher: Springer ,Aug 2016
2. Cardiac Rehabilitation Manual 2nd , by Josef Niebauer .Publisher: Springer; February 2017
3. Geriatric Rehabilitation: From Bedside to Curbside (Rehabilitation Science in Practice Series) 1st ed, by K. Rao Poduri. Publisher: CRC Press; March 2017
4. Physical Medicine and Rehabilitation Digest, 1st ed – by Rajesh Pramanik .Publisher: Jaypee Brothers; January 2017
5. Oxford Textbook of Children's Sport and Exercise Medicine, 3 edition by Neil Armstrong and Willem van Mechelen. Publisher: OUP Oxford, April 2017

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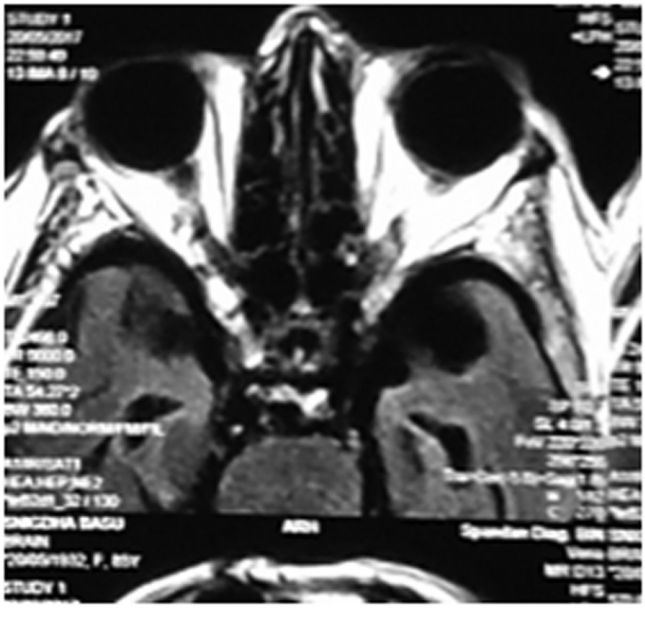
Sudden Onset Bilateral Visual Loss Due To Possible Giant Cell Arteritis

Pramanik R

An eighty five years old hypertensive female without any history of dyslipidaemia or diabetes or thyroid disorder admitted for rehabilitation management due to severe weakness and poor mobility preceding two weeks history of cough, fever, fatigue and arthalgia. There was no past history of stroke, carotid occlusive disease, coagulation disorder or heart disease. Suddenly she complained of bilateral painless loss of vision.

On examination, light perception was absent and there was no direct or consensual light reflex. Fundoscopic examination within hour and onwards did not show any oedema or box scarring of retinal arteries or vein and intra-ocular tension was measured to be normal. She was emotionally stable and did not suffer from any prior psychological illness. She was also complaining of mild headache for last three to four days which was exacerbated for last one day.

Her MRI brain(fig 1) showed age related atrophy, few old infarcts and signal change in bilateral optic nerve, more on right side. Her visual evoked potential (Fig 2) showed retino-optic pathway abnormality. Surprisingly her ESR was 106 in 1st hour. There was tenderness over bilateral temporal artery at that time. Hence she was treated as a case of Giant Cell Arteritis affecting bilateral retinal artery causing sudden, painless loss of vision. She was immediately treated with a trial of bolus dose of intravenous steroid followed by oral prednisolone. She was further rehabilitated with specific orientation, mobility techniques and gait aids like long cane.



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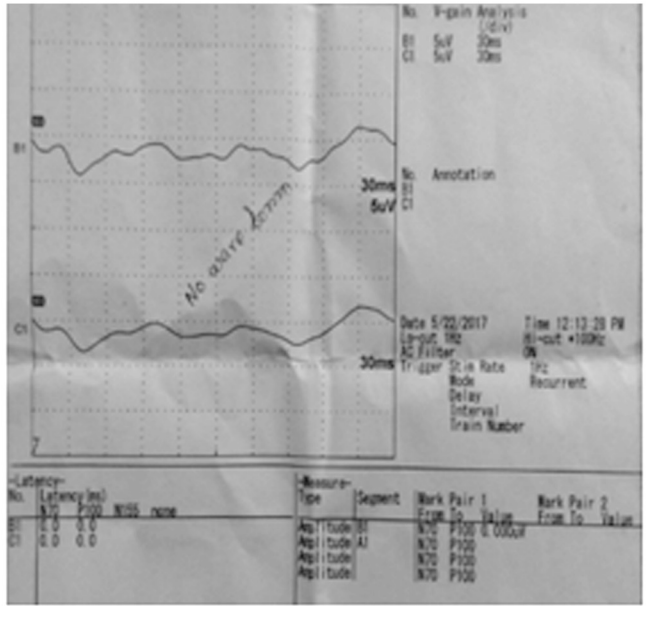

Figure 2

Authors' affiliation:
MD, MRCP (UK), Associate Professor, PMR, IPGME&R, Kolkata
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