

Continuous Muscle Fibre Activity, Isaacs' Syndrome: A Case Report from Central India

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Abstract: Continuous muscle fibre activity or Isaacs' syndrome is a rare condition which represents more severe phenotype of peripheral nerve hyper excitability. It is characterized by muscle twitching, stiffness & hyperhidrosis. The diagnosis of Isaacs' syndrome or neuromyotonia is based on clinical features & classical electromyography findings. We report a twenty six year old man complaining of continuous twitching all over his body and increased sweating. General physical & neurological examination was normal except generalized fasciculation's & hyperhidrosis. Electromyography findings showed classical neuromyotonic & myokymic discharges. The abnormal activity was characterized by doublets, triplets or multiplet single unit discharges that have a high intraburst frequency. This patient was diagnosed as a case of Isaac's disease & treated with tablet carbamazepine 400 mg per day. His symptoms were gradually improved.

Keywords: Isaac's syndrome, Neuromyotonia, Myokymia, Electromyography (EMG)

INTRODUCTION

Patient complaining of muscular pain, fasciculation's, myokymia, contractures, cramps & other milder symptoms are often encountered in neurophysiology laboratory [1]. Two main syndromes are recognized in clinical practice, one is the syndrome of continuous muscle fibre activity characterized by generalized fasciculation's & hyperhidrosis first reported by Isaacs' [2]. The other is stiff-man syndrome describe by Moersch & Woltman, consist of progressive muscle stiffness in proximal limb muscles with superimposed painful spasms [1, 3].

Isaacs' syndrome or acquired neuromyotonia is rare disorder characterized by hyper excitability of peripheral nerves leading to incapacitating muscle twitching, cramps, myokymia, pseudomyotonia & mild weakness [4]. The muscle cramps may be prominent & accompanied by excessive sweating & weight loss [5, 6]. Most patients are sporadic & though the pathogenesis of this disorder is not clear this syndrome may be related to autoimmune diseases such as CIDP (Chronic inflammatory demyelinating polyneuropathy), myasthenia gravis, paraneoplastic syndrome or development of auto antibodies against voltage gated potassium channels (VGKCs) [6]. Electromyography &

nerve conduction study are the two most important investigations for the diagnosis of these disorders.

Here we report a case from central India with classical clinical & neurophysiologic findings suggestive of Isaacs' syndrome. Although Nagpur is geographical centre of India, this type of disease has rarely been reported.

CASE REPORT

A 26 year old man a coal mine worker, from village near by Nagpur (Maharashtra) developed symptoms of twitching over his calf muscles & then all over body, he also complained of mild stiffness & increased sweating. He was referred to neurology out patient department, superspeciality hospital for neurological evaluation. There was no family history suggestive of neuromuscular disorder. General physical examination revealed no abnormality except increased sweating. On neurological examination his mental state, cranial nerves, motor, sensory & cerebellar functions were normal. His calf muscles were enlarged & no percussion myotonia was present. Myokymia occurred in both lower limb & shoulder muscles. There was severe involvement of gastrocnemius-soleus muscle, which resembled a bag of worms. Muscle tone was mildly increased in lower limb, tendon reflexes were

normal & chvostek sign was negative. Laboratory tests revealed normal complete blood counts & hemoglobin. All other tests including urinalysis, immunoglobulin levels, cerebrospinal fluid analysis, and thyroid function tests were normal, no auto antibodies were detected. Neurophysiological investigations were carried out, motor & sensory conduction velocity; compound motor potential amplitude was within normal range. Stimulus induced repetitive nerve discharges after M-waves were demonstrated during motor nerve conduction study (Fig. 1a) & F-wave showed multiple after discharges

(Fig. 1b). Electromyography study with concentric needle electrode demonstrated spontaneous motor unit potentials with various firing patterns, including high frequency bursts & multiple irregular discharges. Mainly at needle insertion motor unit action potentials in doublets & triplets fired briefly (Fig. 1c). On maximum voluntary effort recruitment & interference pattern was normal. This patient was diagnosed as a case of Isaac's disease & treated with tablet carbamazepine 400 mg per day. His symptoms were gradually improved.

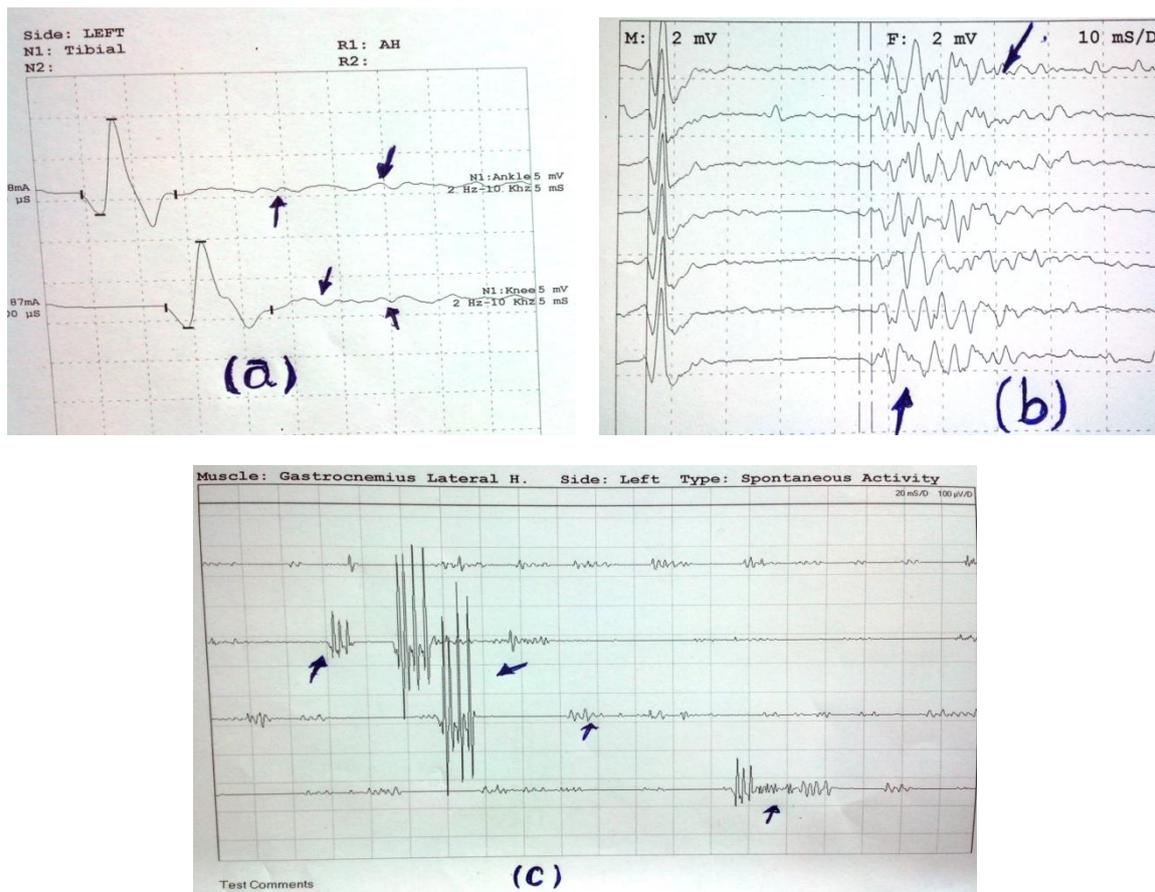


Fig. 1: Neurophysiologic findings: (a) Stimulus induced repetitive discharges (arrow) on motor nerve conduction study. (b) F-wave after discharges (arrow). (c) Spontaneous burst of repetitive firing of motor unit potentials (arrow) of gastrocnemius muscle on electromyography.

DISCUSSION

Isaacs' syndrome is a rare disease that has been rarely reported from central India.

Isaac's syndrome or neuromyotonia is a form of peripheral nerve hyper excitability causing spontaneous muscular activity those results from repetitive motor unit action potentials of peripheral origin. It can be due to acquired, paraneoplastic or hereditary etiology. The acquired form accounts for up to eighty percent of all cases & is usually caused by the antibodies against neuromuscular junction. Though the exact cause is unclear; but autoreactive antibodies can

be detected in variety of peripheral & CNS disorders. Isaac's syndrome has been considered to be one of these, typically caused by the antibodies binding to the potassium channels on motor nerves that results in continuous excitability [7].

The diagnosis is based on clinical features & electromyography findings [4]. The cardinal features include myokymia, pseudomyotonia & stiffness of trunk & limbs. Stiffness without severe pain is reported to be more pronounced in the distal than the proximal muscles. During sleep, this abnormal activity persists. Associated symptoms include weight loss &

hyperhidrosis [2, 5, 6]. Deep tendon reflexes are usually normal to absent & planter response is flexor.

Classical neurophysiologic studies detect myokymic & neuromyotonic discharges on electromyogram. Additionally, fasciculation's, doublet, triplet, multiplet & positive sharp waves are also demonstrated. During motor nerve conduction study, stimulus induced repetitive discharges usually seen after the M-wave & F-wave after discharges have also been reported [6, 8, 9].

In the presented patient his syndrome consisted of myokymia & fasciculation's predominantly in lower limbs.

Neurophysiologic studies were compatible with classical findings of Isaacs' syndrome, excessive sweating seen may be related to the heat generated by excessive muscle activity [10].

Treatment of Isaacs' syndrome usually done with antiepileptic drugs or immunotherapy; often improves the clinical & electromyography findings [11]. It responds to the treatment with intravenous immunoglobulin, plasmapheresis & corticosteroids have been tried successfully [10].

CONCLUSION

Isaacs' syndrome is rare disorder; several clinical & neurophysiologic features seen in our patient underline the role of peripheral nerve damage. There by resulting in continuous muscle fibre activity. Antiepileptic drugs & membrane stabilizing agent like carbamazepine showed remarkable improvement.

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