

## Novel treatment (new drug/intervention; established drug/procedure in new situation)

## Ice pack test: is it obsolete?

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**Summary**

Ophthalmologic signs are the most often presenting symptoms of patients with myasthenia gravis (MG), most common being ptosis. However, ptosis may be caused by a variety of non-myasthenic disorders; hence, the distinction between them and myasthenic ptosis is critical. A battery of diagnostic tests are available to establish the diagnosis of MG, all having their pros and cons, some being life threatening. The authors present a case of 40-year-old male who presented to them with progressive weakness and double vision in which they were successful in narrowing the differentials to myasthenia by performing a simple bed side test.

**BACKGROUND**

In a limited resource setting, edrophonium/neostigmine tests are still preferred over ice pack test even though former has ominous complications and latter being equally effective in diagnosis of myasthenia.

Ice pack test can be performed bed side without any special equipment in a non-ICU set up with nil complications if correctly performed.

**CASE PRESENTATION**

A 40-year-old male presented with progressive fatigue over past 3 months. For past 1 month, the patient noticed that he had intermittent double vision which improved in the morning. He developed drooping of both eyelids since 10 days. Further inquiry highlighted that these symptoms were worse after watching television and at the end of the day. He also had difficulty in eating, especially non-vegetarian food, which according to him was difficult to swallow.

Neurological examination of the patient revealed that he had bilateral ptosis (3 mm palpebral fissure in left eye and

5 mm in right) with some fatigability. Extraocular movements were restricted in all directions to various degrees in both eyes not confined to a particular nerve distribution. There was no squinting in primary position of the eye. No nystagmus was present but he had interrupted saccades. Pupils were normal in size and reacting equally to light. Though he had difficulty in swallowing there was no objective cranial nerve abnormality detected. There was no discernable dysphagia (assessed by speech and language therapy services) or dysphonia, and his cough effort was normal. His single breath count was 26 and he had oxygen saturation of 95% in room air. He had mild weakness of the trunk muscles and proximal limb muscles (grade 4) with difficulty in turning in bed and getting up from supine position. Deep tendon reflexes were normal. The rest of his neurological and systemic examination was unremarkable.

**INVESTIGATIONS**

His routine biochemical and haematological parameters were normal. An ice pack test was performed. Pretest and



**Figure 1** (A) Before ice application. (B) After ice application.

post-test photos were taken for comparison. He had significant improvement in ptosis, thus the test was strongly positive, aiding the diagnosis of myasthenia gravis (MG).

A rapid nerve stimulation test showed fatigability. The neostigmine test, done by injecting 1 mg of neostigmine after preloading patient with 0.6 mg of atropine, was positive. His acetylcholine receptor antibodies were significantly raised, confirming the diagnosis of MG. The presence of a thymoma was ruled out with a CT thorax.

## TREATMENT

He was started on regular tab. pyridostigmine along with tab. prednisolone.

## OUTCOME AND FOLLOW-UP

His weakness subsequently improved and is presently asymptomatic after 3 months of follow-up.

## DISCUSSION

Arrays of tests are available for diagnosis of MG<sup>1</sup> as their distinction from non-myasthenic disorders is crucial. These include serum acetylcholine receptor antibody levels, repetitive nerve stimulation (RNS), the Tensilon test, the neostigmine test, the sleep test, the rest test and the ice test.

The ice pack test is cheap, safe and very quick to perform. The distance between the upper and lower eyelid margin was measured. The ice test was performed by placing a surgical glove filled with crushed ice on the more ptotic eyelid for 2 min ensuring that the ice is covered to prevent ice burns, then the ice pack was removed and the palpebral fissure was remeasured within 10 s. An increase of 2 mm or higher was deemed positive. It was used in this case with striking results (figure 1A,B). The exact mechanism has not been completely explained. It is believed that cooling affects the neuromuscular junction both by decreasing the activity of the acetylcholinesterases<sup>2</sup> and by prompting efficacy of acetylcholine at eliciting depolarisations at the end plate.<sup>3</sup>

In the study by Tabassi *et al* on 156 patients with ptosis, a positive ice test was gauged to have 100% specificity and sensitivity as compared to Tensilon test.<sup>4</sup>

A recent cohort study based on reliability of ice pack test in differential diagnosis of myasthenic diplopia revealed

the sensitivity of 76.9% (CI 49.2% to 92.5%) and specificity of 98.3% (CI 90.3% to 99.9%).<sup>5</sup> No false positives were reported for ice test in diagnosis of MG.

Drawbacks of this test are that its use in MG patients with no ptosis is not advised. Leaving the ice pack in situ for over 2 min is increasingly uncomfortable for the subject. The reduction of muscle fibre temperature below 22°C reduces the contractile force of the muscle and creates potential false-negatives.<sup>6</sup>

It is, therefore, important to realise that in the right symptomatology the ice pack test can be an effective method of bedside clinical diagnosis of MG and possibly prevent the use of expensive diagnostic medications with many unwanted and possibly dangerous side-effects.

## Learning points

- ▶ Ice pack test is safe and reliable test for diagnosis of MG.
- ▶ When correctly performed, sensitivity and specificity is equivalent to those of edrophonium test without any life threatening complications.
- ▶ Hence, it should be a first line investigation for diagnosis of MG in a resource limited setting.
- ▶ However, confirmation with RNS tests and antibody panel is essential before patient is started on lifelong treatment with immunosuppressants.

**Competing interests** None.

**Patient consent** Obtained.

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