



## Case of the month: The skin wrinkle test: a simple nerve injury test for paediatric and uncooperative patients

A Tindall, R Dawood and B Povlsen

*Emerg. Med. J.* 2006;23:883-886  
doi:10.1136/emj.2005.031377

---

Updated information and services can be found at:  
<http://emj.bmj.com/cgi/content/full/23/11/883>

---

*These include:*

### References

This article cites 7 articles, 1 of which can be accessed free at:  
<http://emj.bmj.com/cgi/content/full/23/11/883#BIBL>

### Rapid responses

You can respond to this article at:  
<http://emj.bmj.com/cgi/eletter-submit/23/11/883>

### Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right corner of the article

---

### Notes

---

To order reprints of this article go to:  
<http://www.bmjournals.com/cgi/reprintform>

To subscribe to *Emergency Medicine Journal* go to:  
<http://www.bmjournals.com/subscriptions/>

## EMERGENCY CASEBOOK

## Case of the month: The skin wrinkle test: a simple nerve injury test for paediatric and uncooperative patients

A Tindall, R Dawood, B Povlsen

*Emerg Med J* 2006;23:883–886. doi: 10.1136/emj.2005.031377

Assessment of the distal neurological status after injuries to the hand and fingers is one of the most frequent parts of standard trauma practice. Two-point discrimination as clinical examination is often sufficient to identify such lesions, but difficulties occur in the comatose, young or otherwise uncooperative patient. This article describes a simple pain-free alternative method of assessing digital nerve integrity by submerging the finger tip in water and observing if wrinkles develop on the skin.

A 28-year-old right-handed mechanic accidentally fell through a glass door, sustaining a deep cut to the volar aspect of his wrist. Initial examination showed multiple flexor tendon injuries as well as abnormal two-point discrimination in the radial three digits. Unfortunately, he absconded from hospital before undergoing surgery. A few months later he returned with a dense motor and sensory palsy of the median nerve. Interestingly, in addition to the disabling motor and sensory deficits, he had noticed a curious phenomenon that occurred when his hand was immersed in warm water—that is, the fingers “did not all go wrinkly”. Reproduction of the phenomenon in clinic (by immersing the hand in warm water for 5 min) showed that the area of the skin that did not wrinkle corresponded to the area of the sensory defect—that is, the territory of the median nerve (fig 1).

## DISCUSSION

Autonomic function is often the “Cinderella Modality” of a nerve’s function. The more obvious motor and sensory



**Figure 1** Absence of wrinkling in the denervated median nerve territory and inadvertent burns to the insensate radial two digits are also evident.

deficits can dominate the picture of symptoms. Sympathetic unmyelinated fibres in a peripheral nerve are among the most resistant to mechanical trauma. As such, damage to these fibres suggests a more severe injury. Disturbance of sympathetic function is therefore an important early feature of nerve damage. Testing autonomic function can be difficult and several methods are in common use. Each method relies on either directly or indirectly testing for the presence of sweat.

The simplest method is to look for sweat droplets.<sup>1</sup> Probably the most commonly used test is the ballpoint pen test. This relies on the loss of tactile adherence in an anhydrotic area when a ballpoint pen is lightly drawn across the skin.<sup>2</sup> Lightly dusting the skin with grey quinizarin powder (starch and iodine) shows up the wet areas as deep purple. The print test, using triketohydrindene hydrate, works in a similar way.<sup>3</sup> More quantifiable results can be obtained by testing skin resistance using an electronic ohmmeter (the Richter dermometer), with dry areas of skin having a higher resistance.

Moberg<sup>4–5</sup> and others<sup>6–8</sup> have suggested that the results of the two-point discrimination test and the print test are the most closely correlated with eventual hand function. The print test is messy and inconvenient. It also relies on being able to keep the chemical reagents dry; in practice, this can be difficult.

The common clinical scenario of an injury in a young or inebriated patient can present a challenge when trying to ascertain the presence of a concomitant nerve lesion. Surgical exploration is often necessary to establish the diagnosis or a repeat clinical examination when the patient is more cooperative. The standard method of two-point discrimination is not always feasible in a child and relies on a certain level of cooperation from the adult patient. The more objective sweat-based tests are messy and technically difficult, and so are not often used.

By simply wrapping the traumatised digit in a wet swab on admission to the accident department, within a few minutes, any subsequent examination of the distribution of skin wrinkles by the casualty doctor will show whether any serious injury to the autonomic (and hence other) fibres has taken place. This will hopefully avoid unnecessary surgical exploration, or the even more serious sequelae of a missed nerve injury. AT has also worked in the developing countries, where this simple cheap test has proved extremely useful in the context of limited medical resources.

## Authors' affiliations

A Tindall, R Dawood, B Povlsen, Guy's & St Thomas' Hospitals, London, UK

Correspondence to: A Tindall, 12 Farington House 22 Gloucester Street Pimlico London SW1V 2DN, UK; [alistair\\_tindall@hotmail.com](mailto:alistair_tindall@hotmail.com)

Accepted for publication 17 July 2006

REFERENCES

- 1 Kahn EA. Direct observation of sweating in peripheral nerve injuries. *Surg Gynecol Obstet* 1951;**92**:22–6.
- 2 Harrison SH. The tactile adherence test estimating loss of sensation after nerve injury. *Hand* 1974;**6**:148–9.
- 3 Aschan W, Moberg E. The ninhydrin finger printing test used to map out partial lesions to hand nerves. *Acta Chir Scand* 1962;**123**:365–70.
- 4 Moberg E. Criticism and study of methods for examining sensibility in the hand. *Neurology* 1962;**12**:8–19.
- 5 Moberg E. Evaluation and management of nerve injuries in the hand. *Surg Clin North Am* 1964;**44**:1019–29.
- 6 Vasudevan TM, van Rij AM, Nukada H, et al. Skin wrinkling for the assessment of sympathetic function in the limbs. *Aust N Z J Surg* 2000;**70**:57–9.
- 7 Novak CB, Mackinnon SE, Kelly L. Correlation of two-point discrimination and hand function following median nerve injury. *Ann Plast Surg* 1993;**31**:495–8.
- 8 Phelps PE, Walker E. Comparison of the finger wrinkling test results to established sensory tests in peripheral nerve injury. *Am J Occup Ther* 1977;**31**:565–72.

IMAGES IN EMERGENCY MEDICINE.....

Rigler’s sign in a patient with massive pneumoperitoneum

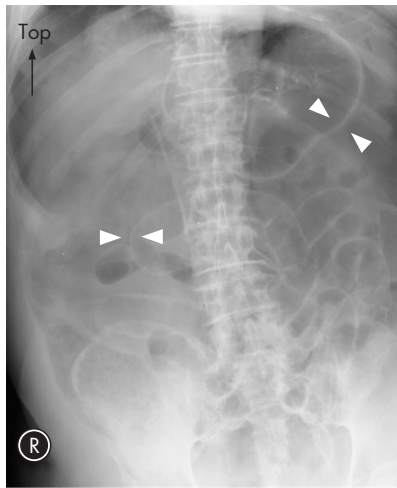


Figure 1 Massive pneumoperitoneum and Rigler’s sign (double-wall sign) on abdominal radiography: the bowel wall is outlined by air both inside and outside (white arrows).

Rigler’s sign (double-wall sign) was first described by Leo George Rigler (American radiologist, 1896–1979) in 1941. This is a radiographical sign of massive pneumoperitoneum. In massive pneumoperitoneum, abdominal radiography shows that the bowel wall is outlined by air both inside and outside. This manuscript presents a case of massive pneumoperitoneum secondary to perforation of the colon.

An 80-year-old man presented to the emergency room with abdominal pain and distension, nausea and vomiting for 1 week. He had constipation for 5 days before the onset of these symptoms. His abdomen was distended, tense and tympanic with tenderness of all quadrants. Abdominal radiography showed extensive pneumoperitoneum and Rigler’s sign (double-wall sign<sup>1</sup>).

Exploratory laparotomy showed a small perforation of the caecum. A limited right colectomy with primary anastomosis was carried out.

Histopathology showed areas of colitis with focal ulceration and thinning, and atrophy of the muscularis propria of the caecum with perforation, secondary to increased pressure in the caecum and increasing tension of the caecal wall.

S Milanchi  
D Wood

Department of Surgery, Cedars-Sinai Medical Center, Los Angeles, California, USA

Correspondence to: S Milanchi, Cedars-Sinai Medical Center, Department of Surgery, 8700 Beverly blvd, Los Angeles, California 90048, USA; [smilanchi@yahoo.com](mailto:smilanchi@yahoo.com)

REFERENCE

- 1 Rubesin SE, Levine MS. Radiologic diagnosis of gastrointestinal perforation. *Radiol Clin North Am* 2003;**41**:1095–115.