

The Furcal Nerve: It's Probable Role in Neuropathic Pain

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Introduction

Anomalous nerves in the foraminal triangle between the traversing nerve and the exiting nerve in MacNab's hidden zone is being documented and recognized with greater frequency. As endoscopic foraminal surgery evolves and becomes more accepted and utilized for a wider range of painful degenerative conditions of the lumbar spine, the ability to recognize the patho-anatomy of pain generators will add scientific information in our understanding of back pain and sciatica. (6)

The Literature on Furcal Nerves

Anatomic studies have shown connections between the lumbar and sacral plexus in 93% of autopsy specimens. This anatomic finding has never received clinical interest until it was discovered to be involved in neuropathic pain in the course of foraminal endoscopic surgery.(3-5) Haijiao (1) reported that MRI could provide accurate information on lumbosacral nerve anomalies, including conjoined nerve root and branches of the furcal nerve. Kikuchi (2) found that the furcal nerve had its own anterior and posterior root fibers and its own dorsal root ganglion, and therefore may cause neuropathic pain similar to the normal spinal nerve at each spinal segment. The basic science literature has descriptions of furcal nerves, but, until now, has been very little clinical consideration of its significance and role in neuropathic pain. It has never been correlated with a treatable source of pain of spinal origin before it was reported by Yeung in his reports, writings and on-going collection and descriptions of furcal nerves as part of an atlas of visualized endoscopic patho-anatomy.(3,6)

Correlation of furcal nerves with neuropathic pain

Yeung first encountered furcal nerves when nerve filaments showed up in pathology specimens following endoscopic debridement. The endoscopic shavers and mechanical instruments collect tissue specimens that are sent to the pathologist for weighing and microscopic inspection. The presence of nerve tissue, fat, muscle and bone was sometimes present along with degenerative disc tissue. Nerve filaments in the surgical specimen were sometimes correlated with temporary post-operative dysesthesia, but nerve filaments were also identified in patients who had no post operative neuropathic pain. This phenomenon was studied prospectively by surgically correlating patient response to nerve stimulation, ablation and tissue biopsy while unanesthetized or partly anesthetized with short acting dilute local anesthesia (.5% xylocaine). It appears that furcal nerves may cause discogenic pain and sciatica. If these nerves are ablated, it can

produce relief of pain, but it can also cause temporary dysesthesia that usually resolves spontaneously or with interventional injections or drug treatment for neuropathic pain.

Current use clinical acceptance and use of foraminal epidural steroid injections for sciatica are thought to be treating inflammation involving normal spinal nerves, but the patient's sensory distribution is often not correlated with a known dermatome. Without knowledge of the existence of furcal nerves, the interventionalist may believe he is treating sciatica arising from the normal spinal nerve traversing the spinal disc. A furcal nerve, however, may be present. It usually exists as a forked branch of the exiting nerve running parallel and lateral to the traversing spinal nerve. It is most commonly seen at L3-4 and L4-5, and can be embedded in the peri-annular fat. . It can also exist as a separate conjoined myelinated nerve running parallel to either the traversing or exiting nerve. It is often described by the radiologist as a conjoined nerve if it is large enough, and shows up in imaging studies. The furcal nerve, however can be only one or two millimeters in diameter and not detectable by MRI. It is most often seen endoscopically in the lateral recess, branching horizontally from the exiting nerve and in the lateral recess at the level of the posterior longitudinal ligament. (6) It can be mistaken for the foraminal or posterior longitudinal ligament during endoscopic discectomy. If it is irritated or ablated, it may produce a mild to severe dysesthesia that will mimic sympathetic dystrophy in clinical presentation. Irritation of the DRG of a normal spinal nerve may produce the same response. Chemical irritation of spinal nerves and furcal nerves may also be responsible for neuropathic pain out of proportion to routine imaging studies.

Treatment

Foraminal epidural steroid injections combined with a lumbar sympathetic block will usually provide temporary relief while the dysesthetic pain takes its course. The adjunctive use of Neurontin or Lyrica may also provide clinical relief. Occasionally, the dysesthesia will also be accompanied by motor weakness.

Endoscopic examples of Furcal nerves

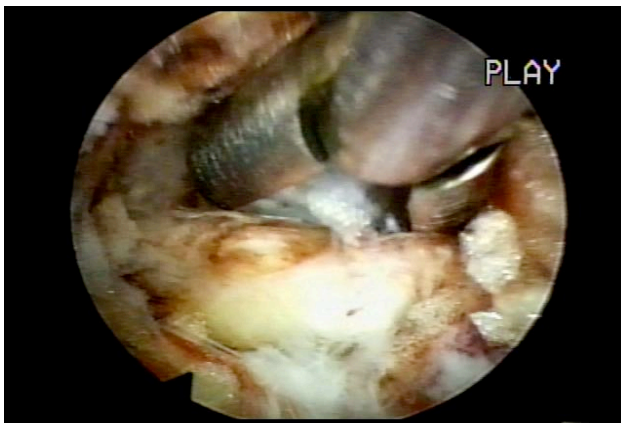


Figure 1. Large myelinated furcal nerve in periannular fat



Figure 2. Small non-myelinated nerve in peri-annular fat

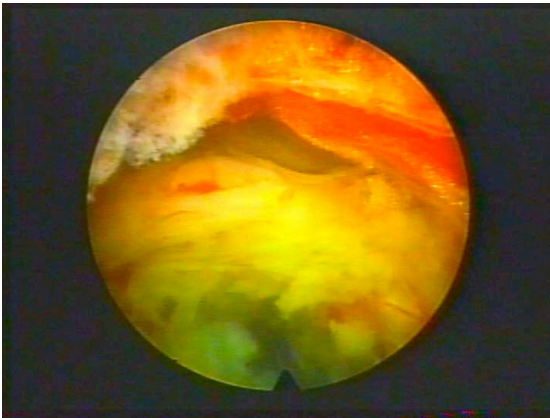


figure 3 large sympathetic nerve trunk in foramen

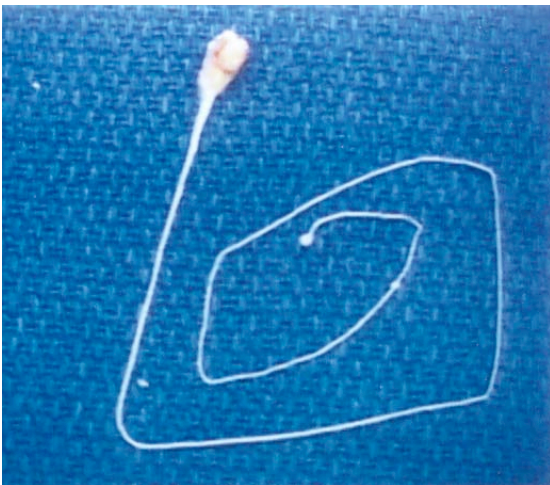


Figure 4 biopsy specimen from sympathetic nerve trunk



Figure 5 Large furcal nerve parallel to the posterior longitudinal ligament and lateral to the traversing nerve

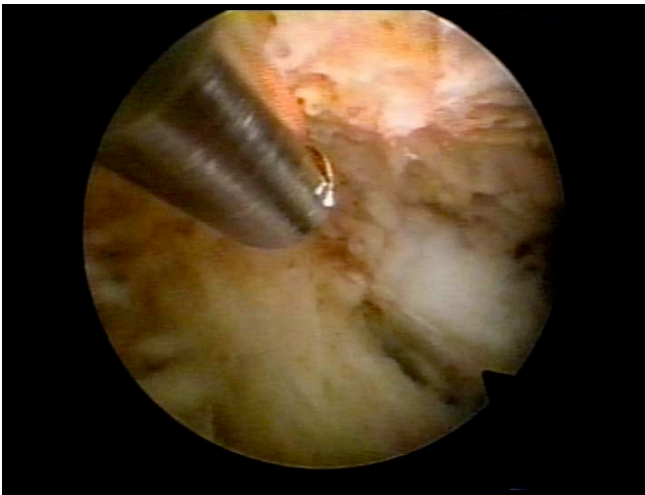


Figure 6. Conjoined or furcal nerve parallel to the exiting nerve in lateral recess stenosis



Figure 7. Furcal nerve branching off exiting nerve

Conclusion

More work is needed to study the role of the furcal nerve for chronic back pain and sciatica. The furcal nerve may be the cause of back pain and sciatica out of proportion to the findings in current imaging studies. It is also an unavoidable risk of foraminal surgery, whether endoscopic or open, that must be accepted by the patient who elects to undergo any foraminal surgery. (3, 4, 5, 6)

References.

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