دراسة مقارنة بين توسيع الثقب العصبى العنقى من الأمام والخلف

رسالة

توطئة للحصول على درجة الدكتوراه

فى جراحة المخ والأعصاب

مقدمة من

الطبيب/ عماد مأمون حمزة أبو المعاطى

بكالوريوس الطب والجراحة – ماجستير الجراحة العامة

مدرس مساعد جراحة المخ والأعصاب

كلية الطب – جامعة عين شمس

تحت إشراف

الأستاذ الدكتور/ حسام محمد الحسينى

أستاذ جراحة المخ والأعصاب

كلية الطب – جامعة عين شمس

الأستاذ الدكتور/ عمر يوسف حماد

أستاذ جراحة المخ والأعصاب

كلية الطب – جامعة عين شمس

الدكتور/ طارق لطفى سالم

أستاذ مساعد جراحة المخ والأعصاب

كلية الطب – جامعة عين شمس

كلية الطــب
جامعـة عين شمس
٢٠٠٩

الملخــص

إن انضـغاط الجـذور العصـبية العنقيـة عـادةً مـا ينـتج عـن الانـزلاق الغضروفى العنقى أو ضيق الثقب العصبى العنقى.

لقد قمنـا فـى هذه الدراسـة بتقسيم ثلاثين حالـة مـن حـالات انضـغاط الجذور العصبية (التى لم تستجب للعلاج التحفظى لمدة لا تقل عن ٦ أسابيع) تقسيماً عشوائياً (حالة لكل مجموعة) إلى مجموعتين كلٍّ منهما يحتوى على خمسة عشر حالة.

وتم علاجهما بمستشفيات جامعة عين شمس بإحدى الطرق الجراحية التالية:

المجموعة الأولى: تم علاجها عن طريق "توسيع الثقب العصبى العنقى من الأمام".

المجموعة الثانية: تم علاجها عن طريق "توسيع الثقب العصبى العنقى من الخلف".

لقد كان الهدف من هذا البحث هو مقارنة هاتين العمليتين الجراحيتين اللتين تعالجان انضـغاط الجـذور العصـبية العنقيـة وتحافظـان علـى الحركـة بالفقرات العنقية.

وكانت المقارنة من حيث أمان العملية الجراحية إلى جانب النتائج الإكلينيكية ونتائج الأشعات التشخيصية التى يتم إجراؤها بعد العملية.

لم يتعرض أى مرض من المجموعتين إلى أيِّ من المضاعفات الدائمة المتعلقة بأيِّ من المدخلين الجراحيين.

من حيث النتيجة الوظيفية لمرضى المجموعة الأولى والتى تم تقييمها باستخدام "توصيف أودوم" أثناء متابعة ما بعد العملية (متوسطها اثنا عشر ونصف شهراً)، كانت النتيجة "ممتازة" أو "جيدة" فى كل الحالات إلا حالة واحدة كانت النتيجة "ضعيفة" حيث لم يتحسن ألم الذراع عند أحد المرضى بعد العملية واحتاجت هذه الحالة لجراحة أخرى من الأمام لاستئصال الغضروف ودمج الفقرات العنقية لوجود زوائد عظمية لم يتم استئصالها بالكامل فى العملية الأولى.

من حيث درجة رضا المريض عن الجراحة، كانت تقييم جميع المرضى إما "راضٍ جداً" أو "راضٍ" إلا حالة واحدة "غير راضٍ جداً" (نفس الحالة السابقة).

اثنا عشر مريضاً (ثمانون بالمائة) قد عادوا إلى مزاولة أعمالهم أو أنشطتهم خلال ثلاثة أسابيع بعد العملية.

وكانت نتائج المجموعة الأولى متماشية مع نتائج المجموعة الثانية من حيث النتيجة الوظيفية للمرضى (كانت كل النتائج فى المجموعة الثانية "ممتازة" أو "جيدة") خلال متابعة ما بعد العملية والتى كان متوسطها خمسة عشر شهراً وربع شهر.

أما من حيث درجة رضا المريض، فكانت كل النتائج فى المجموعة الثانية "راضٍ جداً" أو "راضٍ". كما عاد اثنا عشر مريضاً من المجموعة الثانية إلى مزاولة أعمالهم أو أنشطتهم خلال ستة أسابيع بعد العملية.

فى المجموعة الثانية تعرضت حالة واحدة لعدوى سطحية بالجرح تم علاجها بالمضادات الحيوية عن طريق الفم كما تعرض مريض واحد لتسرب السائل النخاعى من قطع صغير فى الأم الجافية تم السيطرة عليه أثناء العملية.

كما جاءت النتائج العامة للمجموعتين متماشية مع ما قد سبق نشره من أبحاث فى علاج انضغاط الجذور العصبية العنقية سواءً بالجراحة من الأمام أو من الخلف.

لعمليتى توسيع الثقب العصبى العنقى من الأمام ومن الخلف مميزات عديدة منها التوسيع المؤثر للثقب العصبى مع الحفاظ على الحركة وعدم دمج الفقرات

ولهذا تعتبر هاتان العمليتان بدائل جيدة للعملية التقليدية "استئصال الغضروف العنقى من الأمام ودمج الفقرات" ولكن فى الحالات المنتقاة بدقة.

INTRODUCTION

Cervical radiculopathy from intervertebral disc herniation was originally described by ***Mixter and Barr in 1934***, and the treatment has evolved steadily since then.

The posterior cervical approach was popularized by ***Frykholm***. The results obtained in many early series were quite good, even by today's standards. It had the advantage of preserving the spinal motion segment and has been reported extensively to have good success ***(Henderson et al., 1983).***

Since their initial descriptions by Robinson and Smith in 1955 and Cloward in 1958 ***(Cloward, 1958)***, the use of anterior techniques in the surgical management of cervical disc disease has become increasingly common and widespread ***(Aldrich, 1990).***

Alternatively, discectomy without fusion has also been performed with similar favorable results, but most of these patients may actually have fusion in the surgically treated segment ***(Hankinson et al., 1976).***

Unfortunately, bony fusion of a motion segment in the highly mobile cervical spine may result in further progression of degenerative changes at other disc levels eventually requiring further surgery. ***Hilbrand et al. in (1997)***, postulated that up to 25% of the patients who undergo cervical fusion could require treatment of adjacent level disease within 10 years.

An ideal operation for cervical disc herniation must fulfill two requirements:

It must allow complete nerve root decompression and it must preserve motion in the surgically treated segment ***(Tascioglu et al., 2001)***.

For the patient with a unilateral cervical radiculopathy and an imaging-confirmed lateral or foraminal source of nerve root compression, the posterior foraminotomy can be performed as an alternative to anterior cervical discectomy for the safe relief of pain and neurological dysfunction. Moreover, it seems to have many advantages, such as the preservation of motion segments and limited bony work ***(Adamson, 2001).***

This can be also accomplished with the anterior cervical foraminotomy procedure that was refined by ***Jho in 1996***, after previous similar reports in the literature dating to 1968 ***(Hakuba, 1976).***

Such surgical treatment for discogenic radiculopathy might well be called "functional cervical disc surgery" or "functional spine surgery” ***(Jho et al., 2002).***

Along with its many advantages, the anterior cervical approach also carries with it an increased risk of injury to the trachea, esophagus, carotid artery, vertebral artery and recurrent laryngeal nerve ***(Murphy et al., 1973).***

The posterior approach, has the disadvantages of the significant cervical muscular pain and spasm that often follow. The use of wider incisions for adequate visualization and the need for significant paraspinous muscle dissection have generally been blamed for this postoperative pain syndrome, which can result in a slower recovery ***(Cloward, 1958).***

AIM OF THE WORK

To compare clinical and radiological outcomes for the anterior and posterior cervical foraminotomy procedures, in the treatment of patients with unilateral cervical radiculopathy.

SURGICAL ANATOMY OF THE CERVICAL SPINE

Both anterior and posterior approaches to the cervical spine is the subject of study in this thesis. Knowledge of the cervical anatomy and anatomy of the neural foramen is of paramount importance in performing a successful anterior or posterior foraminotomy and avoiding inadvertent nerve injury and approach related complications ***(Zhang et al., 2003 and Russell and Benjamin, 2004).***

BASIC ANATOMICAL CONSIDERATIONS

Osseous Relationships

The cervical spine consists of three atypical and four typical vertebrae. Typical cervical vertebrae, C3 to C6, include a vertebral body (VB) which is relatively small, a vertebral arch, and several processes for muscular attachments and articulations. The pedicles project from the posterolateral aspect of the VBs and, together with the lamina, form the vertebral arch covering the lateral and posterior aspects of the spinal cord **(Fig. 1A)**. The laminae project posteromedially from the pedicles and join in the midline; they have a thin upper border and a wider lower border. The short, bifid spinous processes project posteriorly from the junction of the laminae. The superior articular process faces upward and posteriorly and articulates with the inferior articular process which faces downward and anteriorly **(Fig. 1B)**. The upper projection and the lateral edge of the superior surface of the caudal VB is called the uncus and articulates with the lateral edge of the inferior surface of the cephalad vertebra. These articulations are called the uncovertebral joints or joints of Luschka **(Fig. 1C)** ***(Kawashima et al., 2003)***.

The transverse process contains the transverse foramen that projects laterally, and is attached medially by the anterior and posterior roots. The anterior root of the transverse process arises from the side of VB and ends in the roughened anterior tubercle to which are attached tendinous slips of the scalenus anterior, longus capitis, and longus colli muscles. The posterior root, which is thicker, arises from the junction of the pedicle and lamina and ends in a rounded posterior tubercle, which is positioned lateral to the anterior tubercle. The two roots of the transverse process are connected laterally by the costo-transverse bar that forms the lateral boundary of the transverse foramen. The costo-transverse bar, has a groove on its upper surface that is concave upward to accommodate the exiting nerve (**Fig. 1D)** ***(Kawashima et al., 2003).***

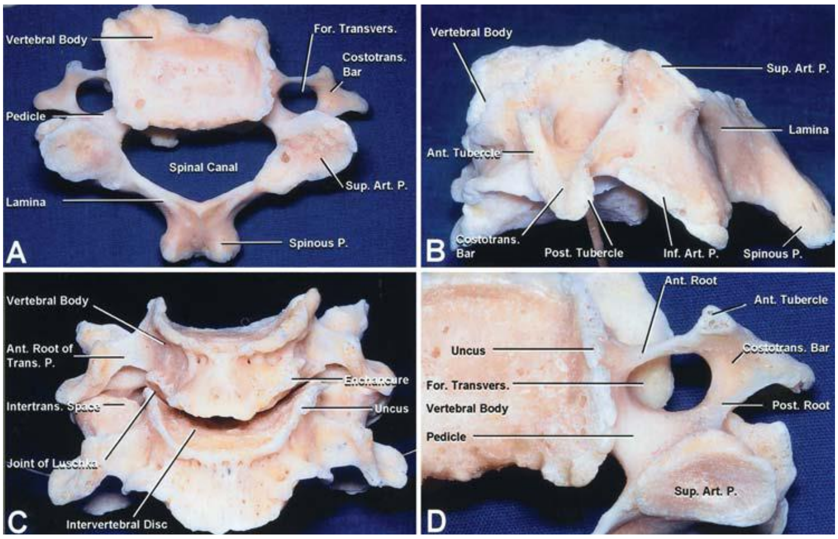

Figure (1): Lower cervical vertebrae. A: Axial view. B: Lateral view. C: Anterior view. D: Enlarged view of the transverse process ***(Kawashima et al., 2003)*.**

Musculature

Anterior Vertebral Muscles

The longus capitis muscle is attached below by tendinous slips to the anterior tubercles of the C3–6 transverse processes, and above to the inferior surface of the basilar part of the occipital bone **(Fig. 2A)**. The longus colli, located on the anterior aspect of the cervical spine. Reflecting or removing the longus capitis and longus colli muscles exposes the transverse process and VA **(Fig. 2C)** ***(Kawashima et al., 2003).***

Lateral Vertebral Muscles

The scalenus anterior muscle lies deep to the sternocleidomastoid muscle, arises from the anterior tubercles of the C3–6 transverse processes, and descends vertically to its attachment to the scalene tubercle on the upper aspect of the first rib **(Fig. 2C)**. The scalenus medius originates from the lateral aspect of the posterior tubercles of the C2–7 transverse processes and attaches to the upper surface of the first rib behind the subclavian groove. The scalenus posterior passes from the posterior tubercles of the C4–6 transverse processes and attaches to the outer surface of the second rib just deep to the attachment of the scalene anterior ***(Kawashima et al., 2003).***

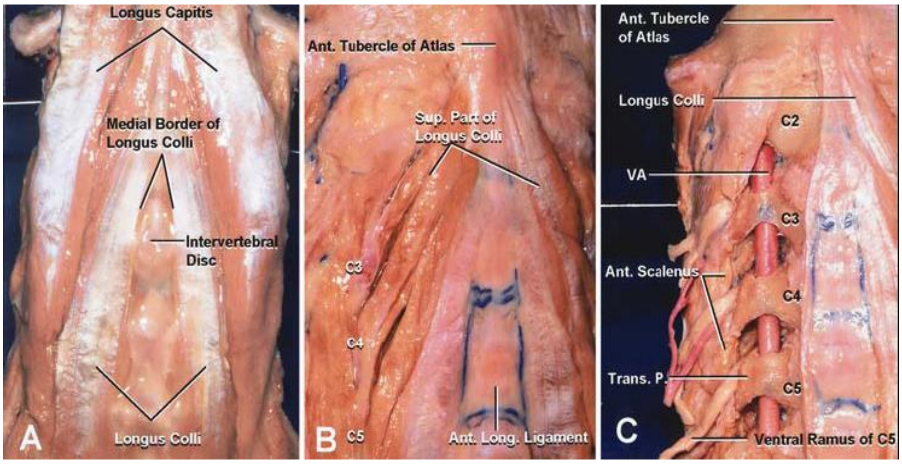

Figure (2): Musculature of the cervical spine ***(Kawashima et al., 2003)***

A: Longus capitis and longus colli
B: Longus capitis has been removed
C: Transverse process and VA have been exposed by removing the longus capitis and longus colli muscles

Posterior vertebral muscles

Dorsal neck muscles consist of four layers ;

A-Outer layer

- The outer layer is formed by the trapezius muscle which is mainly involved in movements of the upper limbs and the shoulder **(Fig. 3A)**. It arises from the external occipital protuberance, superior nuchal line, ligamentum nuchae, and the spinous processes of the seventh cervical and all the thoracic vertebrae. Insertion is into the lateral third of the clavicle, the medial margin of the acromion, and the superior lip of the spine of the scapula ***(Kamibayashi and Richmond 1998)***.

B- Second Layer

- The principal muscle in the second layer is the Splenius Capitis and Cervicis. The levator scapulae is an axioscapular muscle which is located lateral to the splenius capitis **(Fig. 3B)**.
- Splenius capitis arises from the lower half of the ligamentum nuchae, spinous process of the seventh cervical vertebra and the upper three or four thoracic vertebrae. The muscle fibres are directed upward and laterally and inserted, under the Sternomastoid, into the mastoid process and into the occipital bone just below the lateral third of the superior nuchal line.
- Splenius Cervicis arises from the spinous processes of the third to the sixth thoracic vertebrae; it is inserted, into the posterior tubercles of the transverse processes of the upper two or three cervical vertebrae ***(Salmons, 1995)***.

C-Third Layer

- The semispinalis capitis is the principal muscle of the third layer **(Fig. 3C)**. It arises from the transverse processes of the upper six thoracic and the seventh cervical vertebrae, and from the articular processes of the three cervical vertebrae above this, it passes upward, and is inserted between the superior and inferior nuchal lines ***(Salmons, 1995)***.

D-Innermost Layer

- The innermost layer is formed by small suboccipital muscles located between the occipital bone, the first two cervical vertebrae, and the transverso-spinalis below. These include rectus capitis posterior minor and major and superior and inferior oblique muscles. The latter three form the boundaries of the suboccipital triangle which contains the vertebral artery **(Fig. 3D)** ***(Mayoux-Benhamou et al., 1997)***.

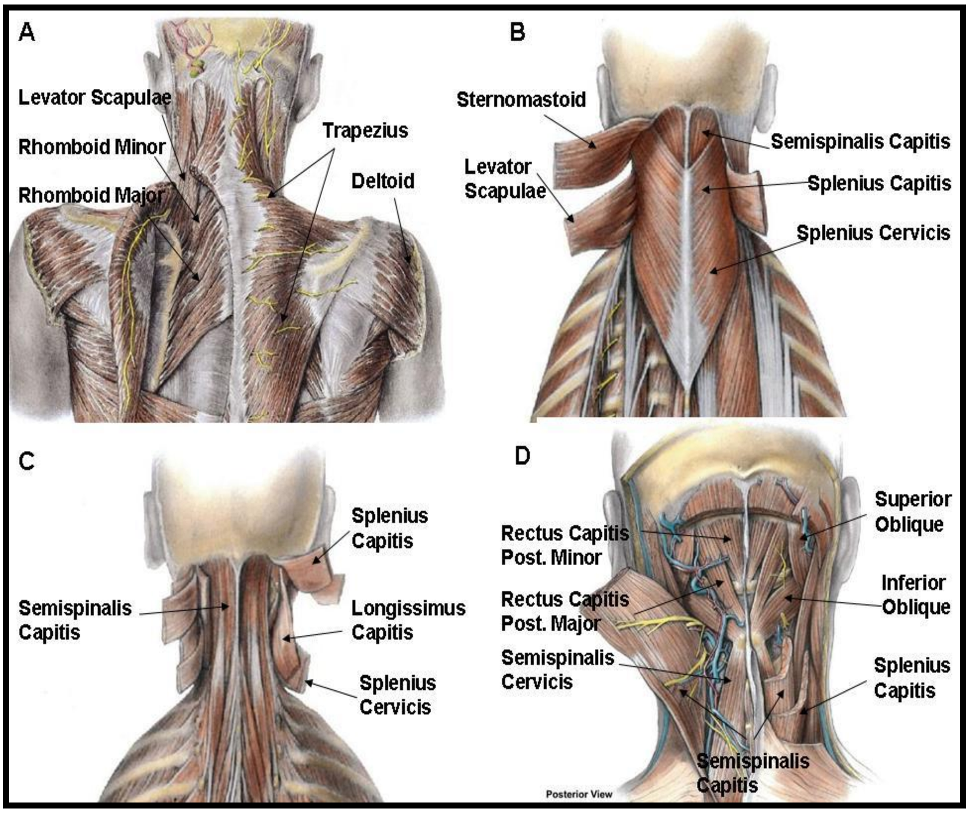

Figure (3): Different layers of the posterior Neck Musculature ***(Agur and Dally, 2005).***

Intervertebral Discs

The intervertebral discs join the vertebral bodies and contribute to the flexibility of the spine. The cartilaginous end plates of the vertebral bodies are the rostral and caudal boundaries of the disc space, and the anterior and posterior longitudinal ligaments overlie, the ventral and dorsal surfaces of the intervertebral disc space. Laterally, the disc space is limited by the uncus ***(German et al., 2005).***

The disc can be viewed as four concentrically arranged zones:

1) Outer annulus fibrosus (ring of densely packed collagen fibrils arranged in parallel oriented lamellae)
2) Inner annulus fibrosus (fibro-cartilaginous layer comprising cells that resemble chondrocytes)
3) Transition zone (thin layer, which contains chrondocyte-like cells)
4) Nucleus pulposus (gelatinous core of disc comprising chondrocyte-like cells ***(Nerlich et al., 1997)***

The vertebral end plates are formed by the rostral and caudal surfaces of the vertebral body. They are composed of concave surfaces of 1.3mm –thick cortical bone. The cartilaginous end plates are the superior and inferior thin surfaces of the intervertebral disc. They are the transition components between the fibro-cartilaginous disc and the vertebral end plates. Each cartilaginous end plate is fused to the vertebral end plate by a calcium layer termed the lamina cribrosa, a sieve-like surface that permits osmotic diffusion of nutrients ***(Yoganandan et al., 2005)***.

The cervical intervertebral discs are not like lumbar discs; they lack a concentric annulus fibrosus around their entire perimeter. The cervical annulus is well developed and thick anteriorly; but it tapers laterally and posteriorly towards the anterior edge of the uncinate process on each side **(Fig. 4).**