

Present and Future of Endoscopy in Spinal Surgery



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Mini Review

Endoscopic spine surgery markedly improved in the last ten years and still is continuing to improve. Due to less soft tissue damage and shorter time to return to normal life for patients, interest to this type of surgery is increasing. Definition of safe access zone for transforaminal approach by Kambin & Gelman [1] and in following years arthroscopic micro discectomy technique defined by Kambin [2] was effective in the improvement of endoscopic spinal surgery [1,2]. Today endoscope is used in cervical, thoracic and lumbar spinal surgery.

Endoscopic approaches in cervical spinal surgery

In cervical region, endoscopic approaches can be anterior and posterior. In endoscopic anterior cervical discectomy; protruded or extruded part of the targeted disc is reached and excised under fluoroscopy control. This technique is preferred since the risk of neighbor segment disease is less and it protects segmental mobility [3]. There are difficulties in patients with marked osteophytes blocking foramen access [4]. Posterior cervical lamino-foraminotomy is a common surgical technique however, due to muscle tissue damage and postop kyphosis it causes widespread neck and shoulder pain. Conversely with full posterior endoscopic approach in short surgical durations enough decompression can be achieved [5]. Patient is placed in prone position and working cannula is placed on the foramen to be decompressed. Foramen is opened with diamond burr.

Endoscopic approaches in thoracic spinal surgery

In thoracic spine video assisted thoracoscopic surgery (VATS) and transforaminal endoscopic surgery techniques are used.

VATS: It is based on the principle of performing discectomy with several surgical instruments and a camera inserted through ribs but due to entry risk to thorax and high learning curve it presents serious challenges [6]. In 1999 Jho [7] defined endoscopic transpedicular thoracic discectomy technique but transforaminal endoscopic discectomy with differing ratios of facet excision is more commonly used [7,8]. In this technique

patient is placed in prone position. Jamshidi needle is placed to the foramen from 5cm lateral of midline under the control of fluoroscopy. Without passing the midpedicular line working cannula is placed to the foramen. Foramen is widened with diamond burr to reach disc. Afterwards disc is removed with endoscope. When these procedures are performed, it is controlled with fluoroscopy [3].

Endoscopic approaches in lumbar spinal surgery

Although in lumbar disc surgery primary method is microdiscectomy in last ten years tendency to endoscopic discectomy is markedly increased. According to the disc pathology there are basically two different approaches; transforaminal and interlaminar. In transforaminal endoscopic discectomy patient is placed in prone position. A needle is placed to the foramen from 10-12cm lateral to the midline under fluoroscopy control. Working cannula is placed to foramen and disc level. With this technique protruded and foraminal discs at the level can be easily reached. In order to reach extruded discs widening of the defect in the capsule might be needed. Superiorly or inferiorly migrated discs can be reached with foraminoplasty with diamond burr. Recurrence rates in transforaminal endoscopic discectomy reported 0% to 12% [9].

Interlaminar endoscopic discectomy is especially preferred in L5-S1 discs but it can be applied to superior disc levels. In this technique, patient is placed in prone position and an 8mm incision is made to the disc level and side. Working cannula is placed to the interlaminar window between muscles under fluoroscopy control (with anteroposterior and lateral images). Ligamentum Flavum is seen with endoscope and then resected with micro punch. Depending on the situation micro rongeur can be used. After ligament is passed working cannula can be placed and dura nad root can be dissected. Herniated disc is seen and extracted. In order to reach superior disc levels, with diamond burr, laminotomy and facetectomy is performed. In superior disc levels discs which are compressing axilla or root can be excised however this method shouldn't be preferred on wide based discs [10].

In lumbar spinal stenosis cases one sided or bilateral spinal canal decompression can be achieved with interlaminar approach. Working cannula is placed lateral to the compressed level with inter laminar approach. With diamond burr lamina is removed from inferior part of the superior lamina until the ligamentum flavum is thinned. Superior part of the inferior lamina is also removed. Bipolar radiofrequency electrocoagulator is used for hemostasis. Afterwards with the help of a punch ligamentum flavum is removed. With this procedure ipsilateral and contralateral decompression can be achieved [11]. Iatrogenic instability rates are lower when compared to the other surgical techniques.

In endoscopic spinal surgery; operation duration, blood loss, patients' hospital stay, postop painkiller usage, infection rates and CSF leaks are less than the other surgical techniques [11]. Besides that patients' return to normal life and workplace is quicker so socioeconomic loss rate are lower.

Endoscopic future of endoscope in spinal surgery

In recent years usage of endoscope in spinal surgery is increased. In future it is expected to be more widespread. It is planned to perform surgeries with better imaging systems and with 3D images [3]. At the same time, in order to increase the sensitivity of the hand movements of surgeons and reduce the complication rates it is expected that robotic surgery will be used in spinal surgeries.

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