Thoracoscopic Treatment of Thoracolumbar Spine Fractures

Essay

Submitted for partial fullfilment of **M.Sc**. degree in orthopaedic surgery

By

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Aim of The Work

This study aims to discuss the techniques and approaches of thoracoscopic spine surgery used in the treatment of fractures of the thoracolumbar spine, its advantages, disadvantages and complications, comparing with conventional surgery in brief.

Introduction

Minimally invasive techniques are becoming more widely used in surgical subspecialties, and standard open surgical procedures are being modified to become less invasive. Anterior spinal surgery is a major and very invasive course of management. A minimally invasive version of the procedure was developed to lessen the associated morbidity, in the form of anterior endoscopic spinal surgery (***Adulkasem and Surangrirat, 2002)***.

The first use of thoracoscopy for the treatment of spinal diseases was developed simaultaneously by Mack and colleagues in the United States and Rosenthal and colleagues in Germany. Thoracoscopic spine surgery was initially applied to treat vertebral body disease or to obtain a tumor biopsy sample. Later, more complex procedures were performed ***(Das and Rothberg, 2000)***.

Among the types of minimally invasive spine surgeries, thoracoscopy has played an early and prominent role. There are several reasons for this. First, functional endoscopes and many soft tissue instruments had previously been developed for thoracoscopic surgery. Therefore, only “bone and disc” instruments required

development. Second, thoracic endoscopy can be performed in a large cavity that is ideal for visualization and working space. Third, this large working space gives us relatively direct access to relevant anatomy ***(Dickman et al, 1999)***.

The advantages of microendoscopic spine surgery include excellent visualization of critical anatomical structures, the level of which is equal to that of open thoracotomy, and the provision of which inflicts far less trauma on normal tissues, resulting in less postoperative pain, shorter hospital stays, and lower complication rates ***(Das and Rothberg, 2000)***.

Under the right conditions, minimally invasive thoracoscopic spine surgery is a safe and effective alternative approach to thoracic and lumbar spine surgery. It can decrease operative time, blood loss, and duration of hospitalization, and it clearly decreases the morbidity associated with thoracolumbar surgeries, without compromising the safety and efficacy of the surgical procedure ***(Amini et al, 2005)***.

History of Thoracoscopy

Origin of Endoscopy:

The word endoscopy is derived from the ancient Greek word that means visualization (scopien) from inside (endo). A primitive form of endoscopy was performed by the ancient Romans who used special instruments called specula (mirror), predecessors of contemporary specula, to look inside the human body. Abulkasim from Córdoba in the 10th century A.D. wrote about illuminating dark cavities of the body, reflecting light into the body from one of these instruments ***(Lewis et al, 1992)***.

The origin of medical endoscopy can be traced to 1806 when Philipp Bozzini from Frankfurt, Germany, developed a novel invention called Lichtleiter (light conductor) *(figure 1)*. This invention is considered the first endoscopic instrument. It consisted of a candle attached to a thin cannula that enabled the light to be projected into body orifices or viscera (i.e., the rectum, urethra, vagina or bladder) to provide visualization of the internal anatomy. The device was limited by its lack of an optical or magnifying system. The Lichtleiter was not accepted by physicians because visibility was poor, and it

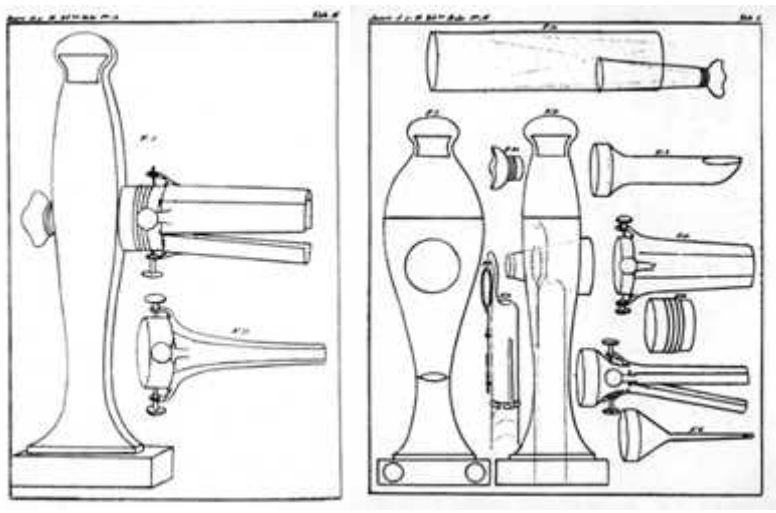

Figure (1): Lichleiter of Bozzini ***(Skopec, 2002)***.

was painful for the patient to have the cannula inserted into the body ***(Rosenthal and Dickman, 1999)***.

In 1853 Desormeaux was the first to introduce the use of a lens to focus a direct light source, by which a clearer image, compared with Bozzini's device, was obtained. This made it feasible to use the endoscope to visualize structures or remove foreign bodies ***(Das and Rothberg, 2000)***.

In 1879 the first cystoscope was developed by Nitze *(figure 2)*, a urologist from Berlin, Beneche, an optician from Berlin, and Leiter, who produced instruments in Vienna. This development represented a major advance

Figure (2): Nitze optical lens system ***(Skopec, 2002)***.

for endoscopy. The instrument had a hollow center with an outer diameter of 7 mm. It incorporated a working channel, an illumination source, and an optical lens system at one end through which light was deflected through the cystoscope. The light source was a heated platinum wire. In 1887, the cystoscope was improved by adding a miniaturized light bulb at the distal end ***(Rosenthal and Dickman, 1999)***.

TWENTIETH-CENTURY DEVELOPMENTS:

In 1910 Hans Christian Jacobeus, after learning the intracavitary techniques from Kelling introduced the technique of pleuroscopy or thoracoscopy. Jacobeus was a professor of internal medicine working in a tuberculosis sanitarium in Sweden. Using a local anaesthetic and the

instrumentation developed by Nitze, Jacobeus performed the thoracoscopic lysis of pleural adhesions and drainage as an adjunct to collapse therapy. In 1921 Jacobeus reported an extensive experience with thoracoscopy in the diagnosis of pulmonary and pleural tumors ***(Das and Rothberg, 2000)***.

Interest in thoracoscopy waned. During the 1950s, it was rarely used, except for the diagnosis of pleural diseases, trauma and occasionally to drain hemothoraces, pleural effusions, and empyemas. In the 1960s, 1970s, and 1980s, thoracoscopy was almost replaced entirely by open surgical techniques for thoracotomy. The resurgence in the clinical use of thoracoscopy in the 1990s was preceded by the explosive growth of endoscopic techniques in other medical and surgical specialties in the 1960s, 1970s, and 1980s. Marked technical improvement in the optical lens systems, fiber optic illumination systems, and improvements in the manipulability and steerability of endoscopes (i.e., flexible steerable endoscopes) fostered the growth of endoscopy in medicine. Its predominant medical uses included gastrointestinal medicine (esophagogastroscopy, proctoscopy, colonoscopy), ear-