The Impact of The Alexander Technique In Improving Posture During Minimally Invasive Surgery

Poster MP41

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Introduction

The concept of minimally invasive surgery (MIS) was formally introduced in Germany through the pioneering work of Wittmoser and Semm. Since the inception of MIS these techniques have been rapidly adopted into the surgical repertoire of most surgical subspecialties. To date there has been extensive evaluation of the benefit of MIS procedures to the patient, however the potential adverse impact of MIS on the surgeon and the remainder of the surgical team has only recently been recognized and is now being investigated worldwide.

Surgical ergonomic research is focused on improving the working environment in the operating room. The field of ergonomics was established in 1950, the etymology of ergonomics is from the Greek roots "Ergon" (Labor) and "nomos" (Law). From an ergonomics viewpoint there are five factors that can impact the surgeons ability to perform MIS:

1. Operating table height and patient positioning
2. The position of the monitors
3. The design of the laparoscopic instruments
4. The use of foot pedals to control energy sources
5. The surgeons posture

MIS often requires surgeons and their assistants to maintain awkward, non-neutral and static postures of both the trunk and upper extremities, thereby limiting the natural shifting of posture. Participating in MIS procedures results in relatively high muscular loading on both the axial and appendicular skeleton putting the surgeon at risk for fatigue and injury.

In 1995 Dr. Alfred Cuschieri noted that MIS is more technically demanding, requires greater concentration and is more taxing on the surgeon's mental energy than conventional open surgery. He coined the term "Surgical Fatigue Syndrome" to describe the decline in surgical performance that occurs over time with MIS.

The Alexander Technique (AT) was developed at the beginning of the 19th century by Frederick M. Alexander (1869-1955). After traditional medical treatments failed to remedy problems with his voice, he began to study his posture. Eventually he cured himself by correcting the positional relationship between his head, neck and spine during activity. Over the past few decades AT has been applied to a variety of neurological and musculoskeletal problems. The scientific basis and the exact manner in which AT brings about its effects are poorly understood, however it can be described as a process of psychophysical re-education of the whole individual, in order to allow movement with minimal strain and maximum ease. AT is based on three principles:

1. Function is affected by use
2. An organism functions as a whole
3. The relationship of the head, neck and spine is vital to the organism's ability to function correctly.

Essentially AT is a way of achieving core stability without specific muscle strengthening exercises. AT has been found to significantly reduce pain, improve overall functional strength and mobility, modify the stress response, and enhance breathing co-ordination.

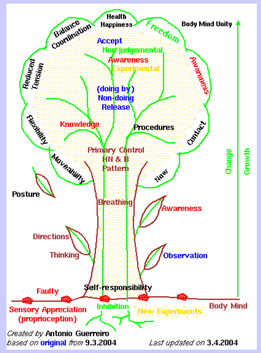
Purpose

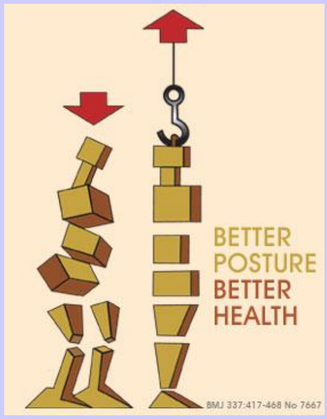
The purpose of this study is to evaluate the efficacy of the Alexander Technique in improving the surgeons posture and ability during the performance of MIS.

F.M. Alexander (1869-1955)
He was an Australian actor who began to experience chronic laryngitis whenever he performed. When his doctors could not help him, Alexander discovered a solution on his own, by studying his posture and muscle movements during various activities using a system of mirrors. Over a career span of more than fifty years, he refined his method of instruction of what has now become known as the **Alexander Technique**.

The Alexander Technique

The Alexander technique is a simple and practical method for improving ease and freedom of movement, balance, support, flexibility, and coordination. It enhances performance and is therefore a valued tool for actors, dancers, and musicians. Practice of the Technique refines and heightens kinesthetic sensitivity, offering the performer a control which is fluid and lively rather than rigid. It provides a means whereby the use of a body part is improved by improving the use of the whole self. (Ref – Barbara & William Conable)





Surgical Posture

Posture is one of the five factors that can impact the surgeons ability to perform with optimal ergonomics. During a MIS procedure, the surgeon often unconsciously assumes an abnormal posture which reduces efficiency and increases the risk of injury, and can lead to 'Surgical Fatigue Syndrome'. This syndrome is associated with mental exhaustion, increased irritability, impaired surgical judgement and reduced dexterity. These factors have the cumulative risk of increasing the probability of surgical errors and injury to the patient.

Materials and Methods

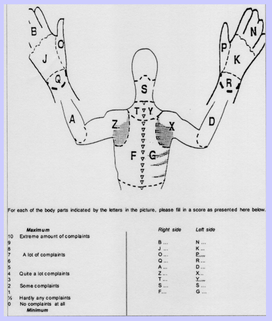
We performed a prospective cohort study in which each subject served as their own control. After obtaining IRB approval, a total of seven test subjects (Four Pediatric Urology Fellows and three Urology Residents) were recruited from the Urology training program. Informed consent was obtained from each of the subjects.

All subjects underwent the following:
PreAT-test of basic laparoscopic skill assessment. The test subjects completed selected modules of the fundamentals of laparoscopic surgery (FLS™). The subjects then completed a questionnaire about pain/discomfort experienced during the modules.
PreAT-test of postural co-ordination and load bearing
PreAT-assessment of posture by an AmSAT instructor
Planned intervention – Two group sessions & then six individual sessions with an AmSAT instructor
PostAT-test of basic laparoscopic skill assessment
PostAT-test of postural co-ordination and load bearing
PostAT-assessment of posture

Subjective and objective data was recorded during the PreAT and PostAT assessments. The data was tabulated and analyzed with descriptive statistics and the paired 't' test (GraphPad), to determine if there was significant difference between the PreAT and the PostAT scores.

Nine Peg Test

This is a simple and reproducible test of manual dexterity. For this study, we assessed the dexterity of both the right and left hand of each subject (in triplicate). The subjects were scored on time and the number of pegs that they dropped during the activity.



Perceived Exertion Scale

We utilized the perceived exertion scale and also the level of exertion and discomfort scale (LED Scale) to assess the level of discomfort/pain that the subjects experienced during the FLS modules.

The PRE-AT and Post-AT scores were compared and statistically analyzed, to determine the impact of the AT training on subjective awareness of discomfort during MIS procedures.

Results

All subjects demonstrated improved ergonomics and improved ability to complete the laparoscopic skills set in a shorter time. The subjects also reported a subjective improvement in their overall posture. The postural assessment scores of the spine, neck, hand and fingers all showed statistically significant improvement Post-AT (p values ranging from 0.0198 – 0.0229). The time load test, which is a test of postural endurance and trunk & shoulder stability demonstrated a statistically significant improvement Post-AT (p = 0.0178).

Overall there was significant improvement in the subjects resting posture and posture during surgical tasks documented by both subjective and objective assessments.

In addition to the scores for the impact on posture, we also noted a significant improvement of the functional and performance assessments:
The scores for the nine peg test were improved Post-At, we did note a more significant improvement for the non-dominant hand in the test subjects.
The effort perceived to perform the transfer of rings module of the FLS was reduced Post-AT (p = 0.0205).
The effort perceived to perform the suturing module of the FLS was reduced Post-AT (p = 0.0219).

Conclusion

The AT training program resulted in a significant improvement in posture and trunk & shoulder endurance from PreAT-training to PostAT-training, accompanied by reduction in perceived discomfort when performing the basic laparoscopic skills assessment. Improved endurance and posture reduces the occurrence of surgical fatigue. Intra-operative fatigue has been shown to be associated with surgical errors. AT training has the potential to reduce the occurrence of fatigue related surgical errors. Additionally it may reduce the incidence of repetitive stress injuries that occur amongst surgeons. Future studies investigating the influence of AT on surgical posture and ergonomics during laparoscopic and open procedures are recommended as this will aid our understanding of the benefits afforded by the AT and allow its implementation into other aspects of surgical training.

We will be undertaking a larger scale cross-specialty assessment of the impact of the AT on surgical ergonomics and posture at our institution.