

Ergonomics: Essential Aspect in Minimal Access Surgery; what are its effects?

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ABSTRACT

Aim: To quantify the physical effects and symptoms in the surgical teams involved in minimal invasive surgery to see the importance of ergonomics.

Study Design: Questionnaire based Prospective study.

Place & duration of study: Department of General Surgery, Khawaja Muhammad Safdar Medical College, Sialkot from June 2017 to June 2020.

Methodology: All subjects were having in common was being working with laparoscope in any capacity. We distributed questionnaire to the surgical teams who are having minimum of 5 years of working as laparoscopic surgeons or assistants. The points which were unclear were made clear by interviewing or calling on the phones. Institutional Ethical committee approval was obtained; similarly informed written consent from the personnel was taken for inclusion in the study. Two groups were formulated and results were tabulated. Group I included surgeons working as team leader or the main surgeon; while Group II included surgeons and OT staff who worked as assistants, camera handlers or trolley assistants during laparoscopic surgery.

Results: The total number of subjects included in study was 230 out of which operating surgeons was 20% and assistant was 80%. Subjects taken from public sector was 26.08% and from private sector was 73.91%. they were divided into two groups operating surgeon was 20% and assistant 80%. Physical problems expressed which concerned the surgical team was discuss in two groups. Pain in thumbs was 8.69% in surgeon and 0% in assistant. Foot ache in surgeon was 26.08% and 5.37% in assistant. Shoulder pain in surgeon was 26.08% and assistant was 5.37%. Stress in surgeon was 21.73% and in assistant was 0% Complication caused by inexperienced surgeon was 20%, inexperienced assistant 46.95% ,small space in OT (operation theatre) was 15.62%, poor quality of equipment was 58.26% mismatch between heights of team members was 7.83%, mismatch between team member and laparoscopy monitor was 10.43%, long operating time was 27.82%, stress and tension due to increased complications as compared to conventional method was 13.04%, dissatisfaction of patients was 4.34%.

Conclusion: Laparoscopic surgery is practiced routinely in all levels of surgical practice. It causes definite physical problems like backache in assistants and team members especially the problems are alarming during initial phases. The frequency is more in assisting team while the experienced surgeons and especially team leaders are quite safe from these physical problems.

Keywords: Ergonomics, minimal invasive surgery, team leader, assistants

INTRODUCTION

The art of Ergonomics is logical and systematically arranging the equipment in a room or operating area do have ease in use of equipment during surgical procedures. So scientific arrangement of surgical theatres and its layout keeping in view safety, output and its training is Ergonomics. It is combination of Ergon that is physical work and Nomos means principles and arrangements. The basis of this science is knowledge of anatomy, physiology and engineering¹.

Workplace efficiency worries in the medical business persist to incline as new thriving technologies and methods are introduced. Awareness of the features of ergonomics-

related obstacles are principle steps regarding adequate interference. Although laparoscopic surgery provides less painful surgery to the patients but not to the surgeons. There are numerous downsides of minimum access surgery².

Minimal invasive interference displays various ergonomic adversities for the doctor, demanding odd body positions and extended static muscle loading that increases chances of musculoskeletal strain and injury³. The medical team in the OT environment is at serious ergonomic risks due to the type of the work such as prolonged standing and cumbersome positions, holding and operating new equipment and materials, long working time, using precision skills. The equipment employed may not be suited to the worker, which can provoke musculoskeletal pain.

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Since minimal access procedures became more developed, and operation hours extended, so did the level of mental and physical toll imposed on the surgical team. The members of operating teams have varied complaints like pain in the wrist, visual problems in focusing, pain in the neck muscles and pain in the hands and difficulty in gripping power of hands and thumbs so instrument handling suffers^{4,5}.

Visual disorientation, static posture, backpain decreases the efficiency of the surgeons. Persistent static and/or awkward posture was perceived as the factor most commonly associated with neck symptoms by 88.9% of respondents. The back and neck are the most common areas of pain. Mostly surgeons experience pain due to posture and the instruments they use^{6,7}. In general, the arrangements of conventional operating theatres are not user- friendly and addition of more and more modern equipment and gadgets have made it worse how to place newer instruments?; so the space for the surgeon, assistants and there placement according to patient and surgical procedure is getting complex and untidy⁸. Workplace organization means that each person of the operating staff has convenient space and accessibility to all apparatus. Lack of equality between the operating team and components can lead to work overload and distress. Surgical staff experiences more physical stress and injuries than the surgeons because of their position^{9,10}.

The prime aim of this line is to suit the settings to the operator, developing better apparatus, workplaces, capacity and training. Understanding ergonomics can make life of the surgeon easy and reduce the physical strain on surgeons and will increase the efficiency of the surgeons during surgery.

No study regarding physical effects of minimal invasive surgery has been carried in Pakistan and in our hospital previously. In the present study, we collected the data of surgical teams in our region and analyzed the physical effects and symptoms caused by minimal invasive surgery in Allama Iqbal memorial teaching hospital affiliated with Khawaja Muhammad Safdar Medical College, Sialkot.

SUBJECTS AND METHODS

All subjects were having in common was being working with laparoscope in any capacity. Institutional Ethical committee approval was obtained; similarly informed written consent from the personnel was taken for inclusion in the study. We distributed questionnaire to the surgical teams who are having minimum of 5 years of working as laparoscopic surgeons or assistants. The points which were unclear were made clear by interviewing or calling on the phones. Two groups were formulated and results were tabulated. Group I included surgeons working as team leader or the main surgeon; while Group II included surgeons and OT staff who worked as assistants, camera handlers or trolley assistants during laparoscopic surgery. Minimum of 5 years working in laparoscopic theatres was must to be included in the study. Occasional workers were excluded from the study. The subjects having chronic symptoms identical to those caused by bad observation of ergonomics that were previously obvious before being part of the team were excluded. Male and female team workers

were included and all age groups were included. All risk factors were recorded and variables analyzed. Minimum of three months of follow up was must for inclusion in the study. Data was entered and analysis done by SPSS v 22.

RESULTS

Study in brief is described in Table I. Expressed reasons for and problems leading to the complaints as perceived and related by the subjects. Physical problems or symptoms expressed which concerned the surgical teams as depicted in Table II

Table I- Study in brief

Total subjects	230	
Operating surgeons	46	(20%)
Team members/ assistants	184	(80%)
Experience of MIS	300-1120 procedures	Mean 342 procedures
Public sector subjects	60	(26.08%)
Private sector subjects	170	(73.91%)
Group I- Operating Surgeons	46	(20%)
Group II- assistants	184	(80%)

Table II- Symptoms

	Group I- Surgeons 46	Group II- assistants 184
Low Backache	10(21.73%)	38(20.44%)
Neck pain/ stiffness	6(13.04%)	42(22.58%)
Visual disturbances	12(26.08%)	34(18.27%)
Pain in wrist	2(4.34%)	26(14.97%)
Pain in thumbs	4(8.69%)	0(0%)
Foot ache	2(4.34%)	0(0%)
Shoulder pain	12(26.08%)	10(5.37%)
Stress	10(21.73%)	0(0%)

Table III: Reasoning-230

Physical effects	Complaints made	%age
Lack of experience of surgeons	46	20
Inexperienced assistants	108	46.95
Small space in the theatre	36	15.62
Poor quality equipment	134	58.26
Mismatch between heights of the team members.	18	7.83
Mismatch between heights of the team members and Laparoscopy Monitor	24	10.43
Long operating time	64	27.82
Stress and tension due to increased complications as compared to conventional surgery	30	13.04
Dissatisfaction of patients	8	4.34%

DISCUSSION

Complications that was caused by lack of experienced surgeon was 20% in our study whereas study conducted by Matern U et al¹¹, reported 13% complications in their study. Inexperienced assistant leads to 46.95% complaints whereas, study by Matern U et al¹², show 34.78% of such complaints. Lack of space and crowding in the theatre leads to 15.62% complications during procedures while 18.97% of such complaints were reported in study by Omar AM et al¹³. Poor quality equipment was the reasoning told by 58.26% complaints and 23.45% cases was reported by

study carried by Nguyen NT et al¹⁴ due to mismatch between heights of team members 7.38% complains had occur in our study while 43.70% complain had occurred in study by Nguyen NT et al¹⁴ difficulties in procedure due to mismatch of height of team members and laparoscopic monitor was 10.43% in our study while study by Uhrich ML et al¹⁵, was 16.45%.long operating time was one of basic factors 27.82% complaints had occur in our study and 12.78% complaints had occur in Uhrich ML et al¹⁵ more complications in comparison of conventional surgery in our study was 13.04% and 45.12% had occurred in study carried by Van Veelen MA et al¹⁶. Dissatisfaction of patients in our study was 4.34% were as in 15.89% had occurred in study by Van Veelen MA et al¹⁷.

CONCLUSION

Laparoscopic surgery is practiced routinely in all levels of surgical practice. It causes definite physical problems like backache in assistants and team members especially the problems are alarming during initial phases. The frequency is more in assisting team while the experienced surgeons and especially team leaders are quite safe from these physical problems.

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