

Unilateral port placement by short statured surgeons in Laparoscopic surgery-An ergonomic strategy to prevent long term shoulder pain.

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Introduction		Methods		Discussion	
Minimally invasive surgery has revolutionized surgical practice over the past three decades. Laparoscopic procedures provide numerous advantages for patients including reduced postoperative pain, shorter hospitalization, improved cosmetic outcomes, and faster recovery. Despite these patient benefits, laparoscopic surgery introduces ergonomic challenges for surgeons that are often underestimated.Laparoscopic procedures require surgeons to maintain static postures for prolonged periods while manipulating long instruments through fixed ports. The requirement to maintain arms in elevated positions and perform repetitive movements may contribute to musculoskeletal fatigue and chronic pain. Several studies have reported a high prevalence of work-related musculoskeletal disorders among laparoscopic surgeons.Shoulder pain represents one of the most common complaints among surgeons performing minimally invasive procedures. Factors contributing to this problem include poor operating room ergonomics, suboptimal monitor positioning, prolonged arm abduction, and instrument design. Surgeon stature relative to operating table height may further influence ergonomic strain.Port placement is a critical determinant of ergonomic efficiency in laparoscopic surgery. Conventional techniques often use bilateral port placement, requiring surgeons to operate with both arms extended and abducted. However, unilateral port placement may allow a more neutral arm posture, particularly for surgeons with shorter stature.Despite increasing awareness of ergonomic issues in surgery, limited research has explored the relationship between surgeon height, port configuration, and long-term musculoskeletal outcomes. The present study investigates whether unilateral port placement performed by short-statured surgeons reduces ergonomic strain and long-term shoulder pain without compromising surgical performance.		Study Design A prospective observational study was conducted over a period of three years at a tertiary care surgical center.		The findings of this study demonstrate that unilateral port placement provides measurable ergonomic advantages for short-statured laparoscopic surgeons. Improved posture and reduced shoulder elevation significantly decrease musculoskeletal strain.	
		Study Population Laparoscopic surgeons performing common minimally invasive procedures were included in the study.		Previous studies have highlighted the high prevalence of occupational injury among surgeons performing minimally invasive procedures. However, ergonomic interventions have often focused on equipment design rather than surgical technique.	
		Inclusion Criteria - Surgeons performing laparoscopic procedures regularly - Procedures including laparoscopic cholecystectomy, appendectomy, and ventral hernia repair		This represents a 30% ergonomic improvement.	
		Exclusion Criteria - Surgeons with preexisting severe shoulder pathology - Surgeons performing robotic surgery exclusively		Shoulder Elevation Digital posture tracking demonstrated: Peak arm elevation reduction: 18°	
		Surgeon Stratification Participants were divided into two groups based on height: Short stature: <165 cm Average/tall stature: ≥165 cm		Reduced sustained shoulder abduction during dissection	
		Ergonomic Assessment Rapid Upper Limb Assessment (RULA) RULA scoring was performed by trained observers to assess postural strain.		Surgeon Fatigue Mean Borg fatigue score: Unilateral port group: 2.3 Bilateral port group: 5.1 (p < 0.01)	
		Digital Posture Tracking Motion tracking systems measured: - Arm elevation angle - Shoulder abduction - Trunk rotation		Long-Term Shoulder Pain Three-year follow-up showed: Unilateral port group: 14% chronic shoulder pain Bilateral port group: 37% chronic shoulder pain (p < 0.05)	
		Borg Perceived Exertion Scale Immediately after surgery, surgeons rated their physical fatigue on a Borg scale.		Surgical Outcomes No significant differences were observed in:	
		Long-Term Musculoskeletal Assessment Annual evaluation was performed using the Nordic Musculoskeletal Questionnaire.		•Operative time	
		Operative Outcomes The following parameters were recorded: - Operative time - Intraoperative complications - Conversion to open surgery - Length of hospital stay		•Conversion to open surgery	
		Statistical Analysis-Continuous variables were analyzed using Student’s t-test, while categorical variables were compared using chi-square analysis. Statistical significance was defined as p < 0.05.		•Postoperative complications	
				•Length of hospital stay	
				This confirms non-inferiority of surgical outcomes.	
				Conclusion: Unilateral port placement confers a practical ergonomic advantage for short-statured laparoscopic surgeons, translating into reduced shoulder loading, lower immediate discomfort, and substantially less long-term shoulder morbidity—without sacrificing operative efficiency or patient safety. Integrating stature-aware port planning into training curricula and routine case setup can enhance surgeon well-being and career longevity. Future work should refine height- and task-specific port templates and evaluate scalability across subspecialties and robotic platforms.	