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Review Article

Uniport Versus Multiport Video Assisted Thoracoscopic Surgery (VATS): Comparisons and outcomes: A Review Article

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Abstract

There are controversies regarding the number of ports in video-assisted thoracoscopic surgery (VATS). The aim of this review is to compare the outcomes of multiport VATS and uniport VATS in form of postoperative pain, hospital stay, the volume of blood loss, duration of operation, duration of postoperative drainage and conversion rate. Although lacks a high level of evidence, this short review showed that uniport VATS might be a preferred alternative approach in thoracic surgery. Patients with uniport VATS have shorter hospital stays, less pain, early recovery and sooner removal of the chest tube.

1. Introduction

Three decades ago, open thoracotomy and sternotomy were considered the main approaches for the treatment of thoracic disorders, but since minimal invasive surgery has advanced promptly, video-assisted thoracoscopic surgery (VATS) is currently used to diagnose and treat a number of chest-related diseases. In this procedure, fewer and shorter cuts (incisions) are made than in conventional open surgery. VATS has been proposed as a less invasive alternative to thoracotomy for the

detection and treatment of a wide range of thoracic pathologies. It is regarded as an efficient and safe method with fewer surgically related problems [1]. In the beginning, VATS was performed through several thoracic wall ports in the multi-port VATS (M-VATS) model, now a day, uni-port VATS (U-VATS) has become a promising evolution at least from some authors' perspectives [2].

The aim of this review is to compare the outcomes of M-VATS and U-VATS in the form of postoperative pain, hospital stay, volume of blood loss, duration of operation, duration of postoperative drainage, conversion rate, and post-operative complications.

2. Postoperative Pain

Postoperative pain is a crucial issue for both patients and surgeons. It is a leading cause of a number of complications like atelectasis, pneumonia, deep venous thrombosis, etc. Matsuura et al., compared 184 patients with M-VATS anatomical resection to 69 patients who underwent U-VATS. A multivariate logistic regression analysis revealed that M-VATS was the predictor for an increase in postoperative pain (P=0.0001, odds ratio=0.204) [3]. In a metanalysis by Cheng and associates, which included 16 articles comparing single-port, two-port, and multiple-port VATS, there was a lower visual analog pain score on the first and third postoperative days in U-VATS compared to M-VATS [4]. Socci and colleagues reviewed 24 patients who underwent VATS lung volume reduction surgery; 15 cases had M-VATS and 9 patients had U-VATS. The researchers did not find a significant difference between the two groups [5].

3. Hospital Stay

Length of hospital stay was the main question for at least 10 studies including 1469 patients. The average duration of hospital stay for the M-VATS and U-VATS groups was 7.0±3.6 and 6.3±2.4 days, respectively. This indicated that there was a significant increase in pain scores with the M-VATS [2]. This finding was denied by other studies [6].

4. Blood Loss

Shen and colleagues compared 115 cases of U-VATS with 296 patients with M-VATS, they found that the volume of blood loss was similar between the two groups [6]. The review by Yang et al., which included 744 patients in eight studies comparing data of blood loss between the two modalities of VATS, showed increased blood loss significantly in M-VATS (uniport: 97.7±60.0 vs. multiport: 116.7±99.7 mL, SMD = −0.27; 95% CI: −0.46, −0.08; P=0.006). It is worth noting that, there was moderate heterogeneity between the two arms in the random effects model (P-value 0.02) [2].

5. Operation Duration

Wang and associates reviewed their eight-year experience and compared M-VATS with U-VATS in terms of operative time. The groups were revised using the propensity score matching technique. The mean operative times of M-VATS and U-VATS were 191.2 ± 51.82 and 169.9 ± 39.58 minutes respectively. The difference was statistically significant (P-value 0.029) [7]. Song and colleagues compared 26 patients of U-VATS with 47 patients of M-VATS, the difference was not significant statistically (205.4±50.6 minutes versus 189.4±50.8 minutes, p=0.259) [8]. A recent meta-analysis that included 16 studies and 3685 patients compared operative time data of M-VATS with U-VATS. The average operative times for the three-port, two-port, and single-port VATS patients were 148.84±45.6 minutes, 154.18±37.9 minutes, and 168.58±48.5 minutes, respectively. The analysis showed no significant difference [4].

6. Postoperative Drainage Duration

Duration of postoperative chest tube has a theoretical impact on the overall operation outcomes. There are controversies regarding the relationship between the number of ports and the duration of drainage. Zhao et al., studied the duration of postoperative drainage among 129 patients (73 cases of U-VATS and 56 cases of M-VATS), there was no significant difference between the two groups (4.2±1.4 minutes versus 4.1±1.1 minutes) [9]. Yang and colleagues reviewed six studies with 651 patients comparing the duration of postoperative drainage between M-VATS and U-VATS, U-VATS showed a small reduction in the duration of postoperative drainage (4.39±2.48 vs. multiport: 4.99±3.24 days) [2].

7. Conversion Rate

Conversion from minimally invasive surgery to open classical thoracotomy may be encountered during VATS. This is usually caused by disastrous new development or failure to progress. Five studies compared data about the rate of conversion to classical thoracotomies or the requirement for additional ports. There was no significant difference between the uniport and multiport VATS groups in terms of conversion rate (uniport: 2.0% vs. multiport: 1.8%) [4].

8. Other Postoperative Complications

The studies revealed that there was no significant difference in the incidences of atrial fibrillation (P=0.945), atelectasis (P=0.982), bleeding (P=0.362), and pleural effusion [9]. The rate of redo operation for persistent air leaks, bleeding, or infection was nearly the same [1-9].

9. Conclusion

Although lacks high-level evidence, this short review showed that U-VATS might be a preferred alternative approach in thoracic surgery. Patients with U-VATS have shorter hospital stays, less pain, early recovery, and sooner removal of the chest tube.

Declarations

Conflicts of interest: The author(s) have no conflicts of interest to disclose.

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