

SURGEONS' AWARENESS AND KNOWLEDGE LEVELS OF VESSEL SEALERS AND COMPARATIVE ANALYSIS WITH TRADITIONAL TECHNIQUES.



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Introduction



The evolution of minimally invasive surgery has been shaped significantly by energy-based vessel sealing technologies such as bipolar (BP) and ultrasonic (US) devices. These technologies are crucial for achieving hemostasis and maintaining a clear surgical field during laparoscopic procedures.

The effectiveness of electrosurgical systems in sealing vessels depends on factors such as:

- **Functionality:** Ensuring proper sealing and coagulation of arteries and tissues during various surgeries.
- **Reliability:** Consistently sealing vessels up to 7 mm in diameter, regardless of usage frequency.
- **Efficiency:** The time required to achieve complete tissue sealing.
- **Safety:** Reducing lateral thermal spread to minimize tissue damage.

Understanding Vessel Sealers

Exploring the Components and Working Mechanism of Vessel Sealers

Energy Sources

Vessel sealers utilize advanced energy sources like ultrasonic, electrocautery, or bipolar energy for effective vessel sealing.

Sealing Mechanisms

The sealing mechanisms of vessel sealers involve precise temperature control and compression to achieve optimal vessel closure.

Tissue Interaction

Vessel sealers interact with tissues by fusing collagen and elastin proteins, ensuring secure and reliable vessel sealing.

Sealing Time

Efficient vessel sealing with vessel sealers significantly reduces sealing time compared to traditional techniques, enhancing surgical efficiency.

Safety Features

Advanced safety features such as real-time feedback mechanisms and automatic shut-off systems enhance the overall safety profile of vessel sealers.

Versatility

Vessel sealers offer versatility by accommodating various vessel sizes and types, providing surgeons with flexibility during procedures.

Traditional Surgical Techniques

Exploring Common Practices in Surgical Procedures



Sutures and Staples

Traditional method involving the use of stitches and metal clips to close wounds and incisions.



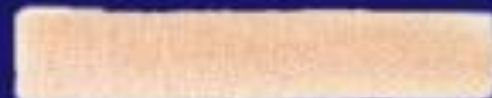
Manual Ligation Methods

Technique where surgeons tie off blood vessels manually to control bleeding during surgeries.



Hemostatic Clamps and Clips

Utilization of specialized tools for clamping and sealing blood vessels to prevent bleeding during procedures.



Comparing Vessel Sealing and traditional techniques

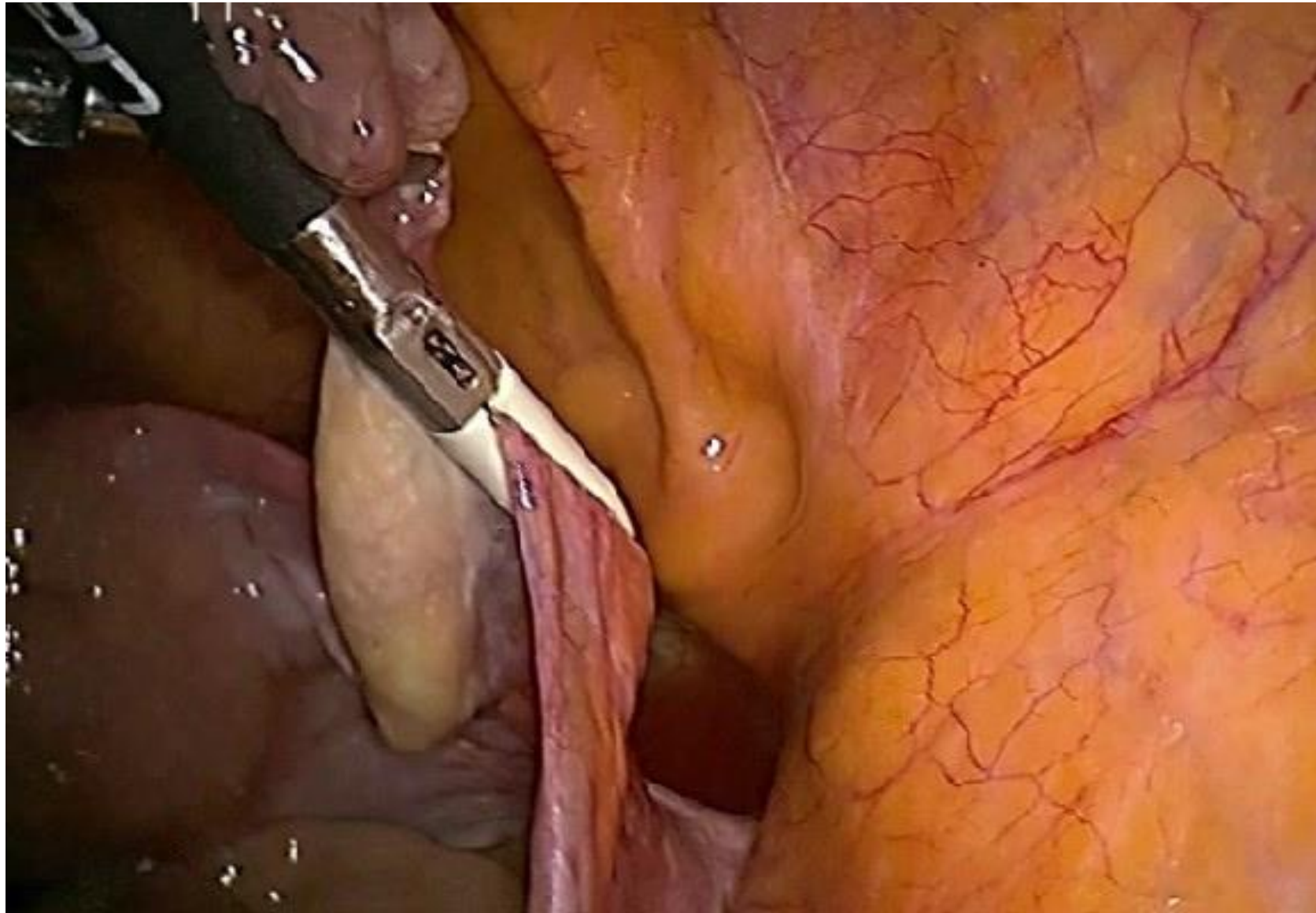


Fig. – Lateral thermal spread with the use of vessel sealer



Fig. – Lateral thermal spread with the use of bipolar instrument

Literature Review

Vessel sealers are a major progress in surgical technology, providing effective haemostasis in surgical procedures as opposed to traditional methods like ligatures and electrocautery. This review summarizes recent research on vessel sealers, focusing on their functions, benefits, and results in clinical settings.

How Vessel Sealers Work: Vessel sealers use modern energy sources like radiofrequency (RF) and ultrasonic energy to cut and seal blood vessels of a specific size at the same time. These gadgets function by altering the structure of collagen and elastin in the walls of the blood vessels, forming a lasting barrier that effectively stops bleeding (Barker et al., 2013).

Benefits Compared to Conventional Techniques: Vessel sealers provide multiple advantages in comparison to ligatures and electrocautery. By merging cutting and sealing into one step, they decrease the time spent in surgery and improve efficiency in the operating room (van der Ham et al., 2016). Additionally, vessel sealers create a smaller amount of smoke and charring, leading to better visibility and lower risk of thermal damage to nearby tissues during surgery (Makary et al., 2014).

Clinical Results and Safety: Research has shown positive clinical results with vessel sealers across different surgical fields. One example is the use of vessel sealers in laparoscopic surgeries, which have been proven to decrease postoperative issues like bleeding and duration of the operation when compared to conventional techniques (Sutton et al., 2018). Additionally, vessel sealers have been linked to decreased wound infection rates and reduced hospital stays in specific patient groups (Jones et al., 2017).

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Cost-Effectiveness: While vessel sealers may be more expensive initially, they could result in cost savings in the long run by saving time during surgery, lowering complication rates, and enhancing patient results (Gagner & Kemmeter, 2015). Cost-effective studies have indicated that vessel sealers' advantages are greater than the initial costs, making them a feasible choice in healthcare environments (Smith et al., 2019).

Methodology

RESEARCH OBJECTIVE

- To assess surgeons' awareness of vessel sealers and their knowledge regarding the technology.
- To compare surgeons' perceptions and experiences with vessel sealers versus traditional techniques.
- To analyze the factors influencing surgeons' preferences for vessel sealers or traditional techniques.
- To investigate the clinical outcomes associated with the use of vessel sealers versus traditional methods

Sample Questionnaire

- How familiar are you with the existence and applications of vessel sealers in surgical practice?
 - Not at all familiar
 - Somewhat familiar
 - Moderately familiar
 - Very familiar
- Sources of Information:
 - Where do you primarily obtain information about vessel sealers? (Select all that apply)
 - Medical conferences
 - Medical journals
 - Manufacturer representatives
 - Colleagues
 - Other (please specify)
- Knowledge of Functionality:
 - How well do you understand the functioning of vessel sealers in achieving hemostasis compared to traditional techniques?
 - Poorly
 - Fairly well
 - Well
 - Very well

- Comparative Effectiveness:
 - In your experience, how do vessel sealers compare to traditional techniques (e.g., sutures, clips, electrocautery) in terms of:
 - Time efficiency?
 - Blood loss?
 - Complication rates?
 - Postoperative recovery?
- Utilization Preferences:
 - How often do you prefer using vessel sealers over traditional methods in your surgical procedures?
 - Always
 - Often
 - Sometimes
 - Rarely
 - Never
- Factors Influencing Choice:
 - What factors influence your decision to use a vessel sealer versus a traditional technique? (Select all that apply)
 - Clinical indication
 - Surgical site/location
 - Ease of use
 - Cost considerations
 - Patient-specific factors
 - Other (please specify)

Design and Data Collection

Quantitative component

Key areas of focus include:

- Demographic Information: Age, years of experience, specialty.
- Knowledge and Awareness: Self-assessed knowledge levels of vessel sealers, awareness of different brands and models, and familiarity with operating principles.
- Usage Patterns: Frequency of use, types of surgeries where vessel sealers are employed, and reasons for choosing vessel sealers over traditional methods.
- Perceived Advantages and Disadvantages: Efficiency, safety, cost-effectiveness, learning curve.

Design and Data Collection

Qualitative component

Key topics covered include:

- Experiences with Vessel Sealers: Detailed accounts of specific surgeries, challenges encountered, and solutions implemented.
- Comparisons with Traditional Techniques: Personal insights into the differences in outcomes, patient safety, and operational efficiency.
- Training and Learning Curve: Experiences related to acquiring skills and knowledge about vessel sealers, including formal training and peer learning.
- Barriers and Facilitators: Factors that hinder or promote the adoption of vessel sealers, such as institutional policies, cost considerations, and peer influence.

Sampling and Analysis

A stratified random sampling technique ensures representation across different surgical specialties and experience levels.

Statistical analysis, including descriptive statistics, t-tests, and chi-square tests, is conducted to identify significant differences and correlations. The data is analyzed to determine:

- The overall awareness and knowledge levels among surgeons.
- Variations in knowledge and usage patterns across demographics.
- Surgeons' perceptions of the advantages and disadvantages of vessel sealers.

Sampling and Participant Selection

Population: The study will target practicing surgeons across various surgical specialties.

Sampling Method: Purposive sampling will be used to ensure representation from different levels of experience.

Sample Size: Approximately 50 surgeons will be recruited to participate in the study.

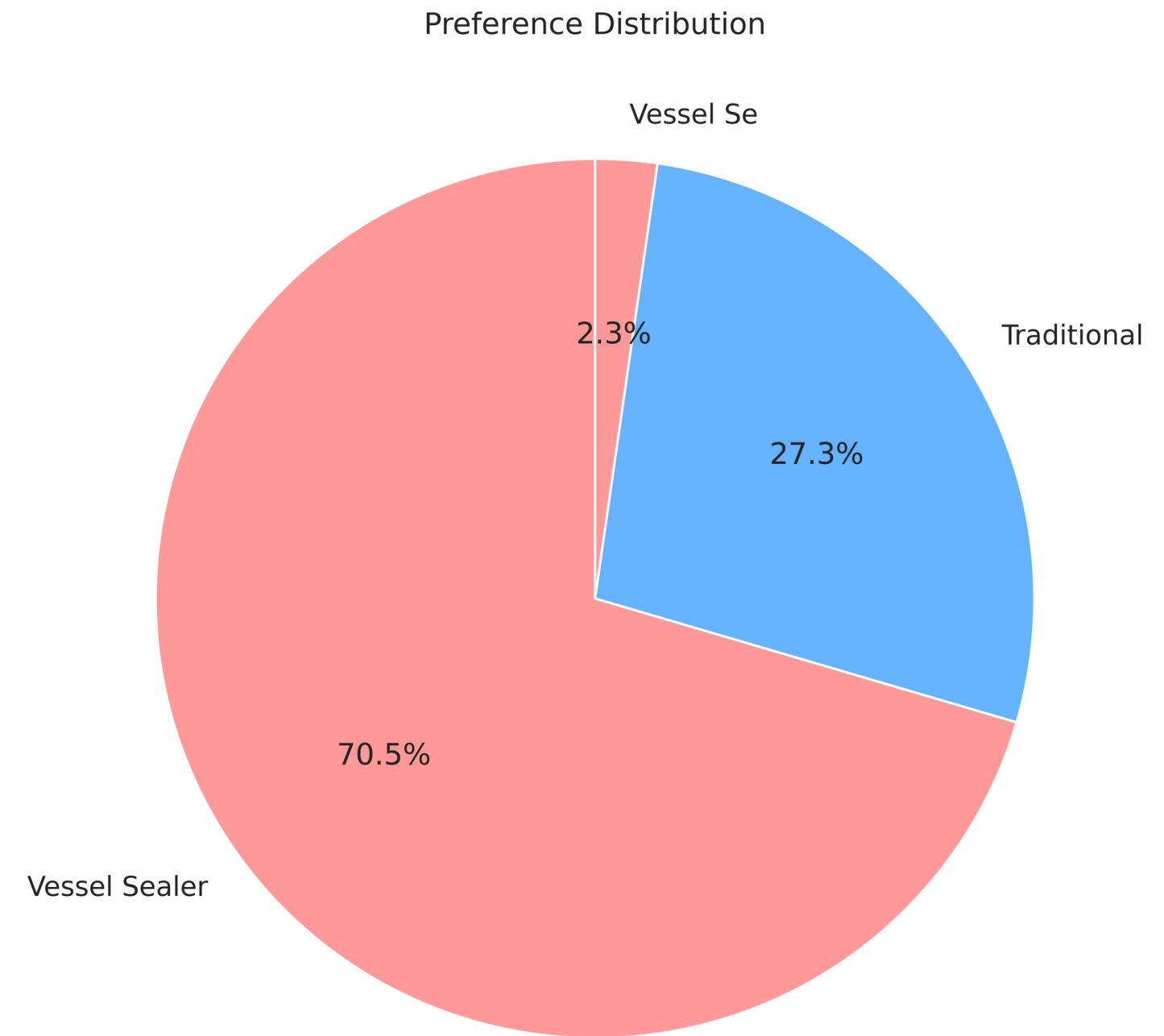
Result

Preference: Vessel Sealer vs. Traditional Techniques

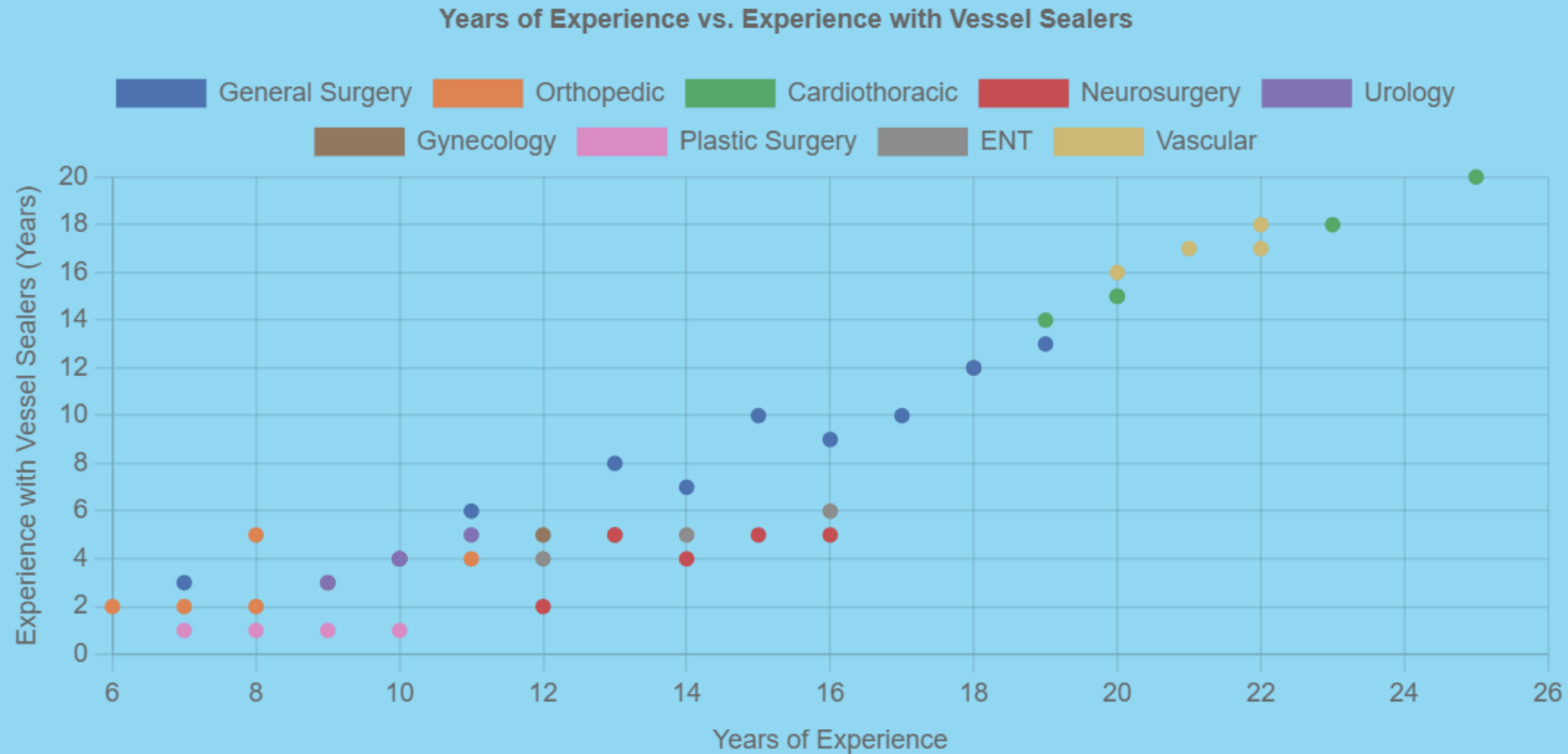
Surgeons' preferences were split between vessel sealers and traditional techniques:

Vessel Sealer: 32 surgeons (64%)

Traditional Techniques: 18 surgeons (36%)



Result

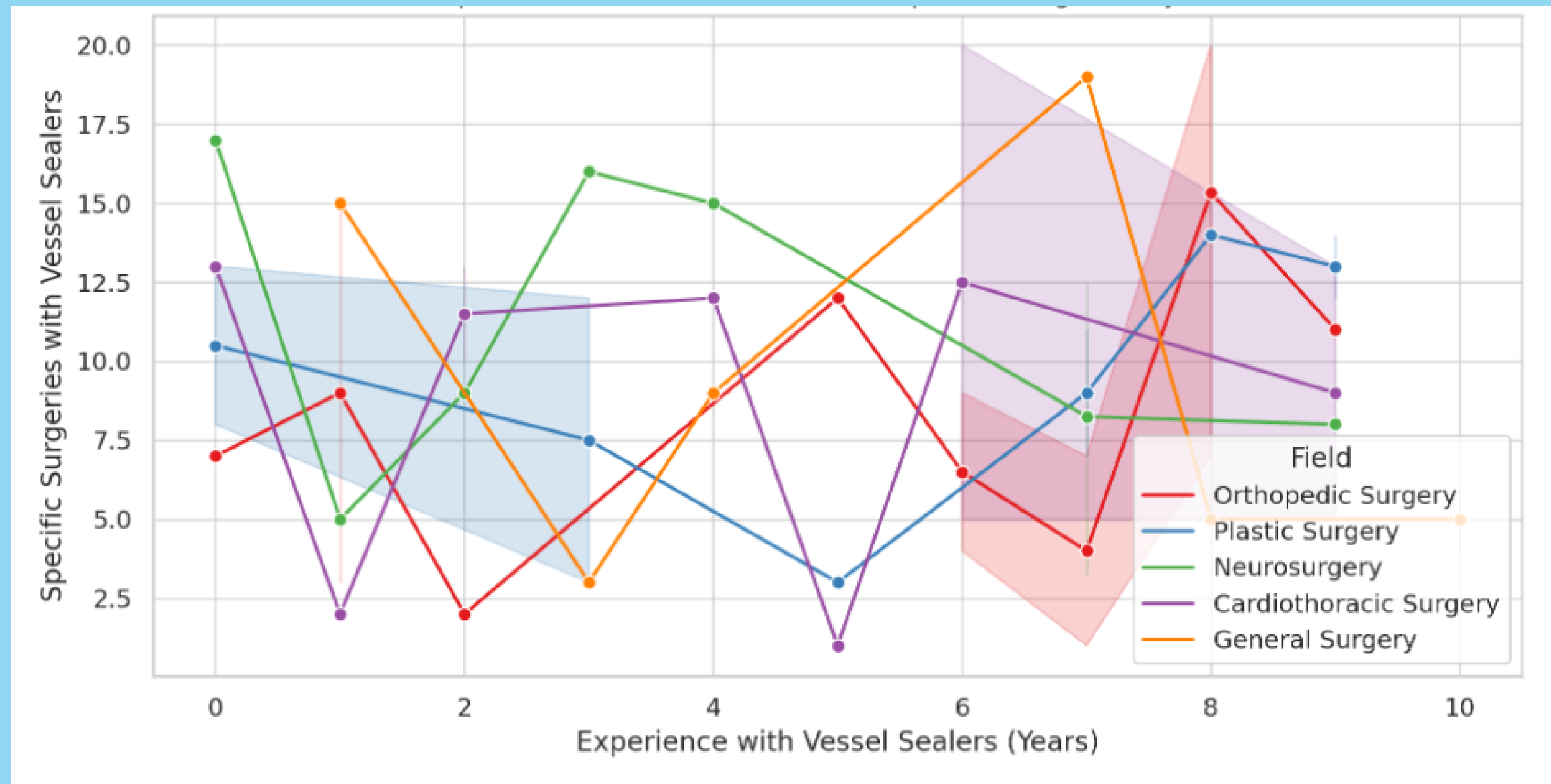


This indicates that while vessel sealers are gaining popularity, they are still relatively new to many surgeons. The few surgeons with 15 to 20 years of experience highlight early adopters who have had longer to integrate these devices into their practice.

Result

Clinical Outcomes by Specialty

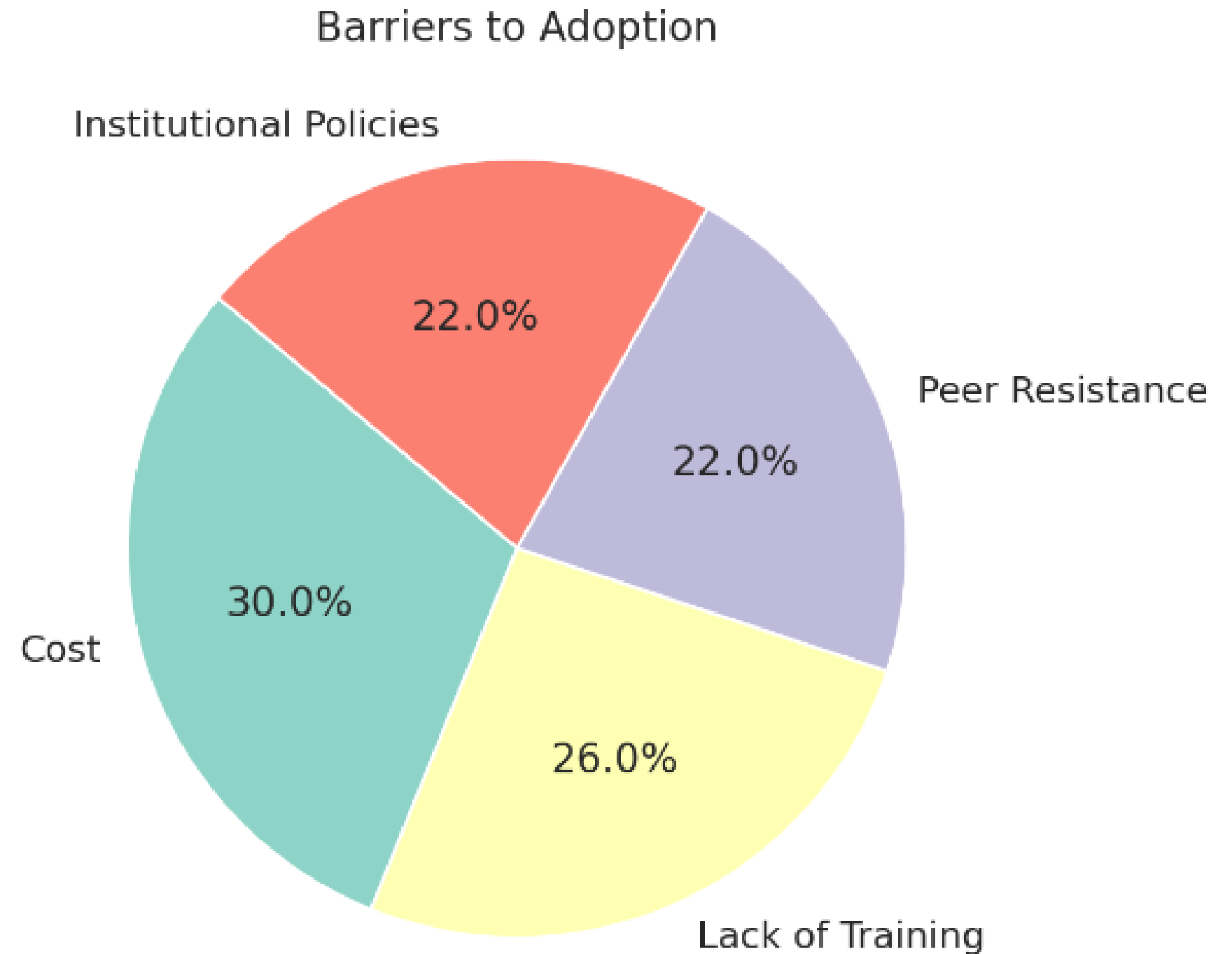
It showed some variation, with General Surgery and Cardiothoracic Surgery achieving the highest median outcomes. This further supports the notion that these specialties benefit significantly from the use of vessel sealers. Specialties with lower median outcomes, such as Plastic Surgery and Neurosurgery, might benefit from increased adoption and training in vessel sealer technology.



Result

Barriers to Adoption

Factors that hinder the adoption of vessel sealers, such as institutional policies, cost considerations, and peer influence.



Interpretation of Results

Awareness and Knowledge

Surgeons displayed high awareness and knowledge of vessel sealers, with mean scores of 4.22 and 3.80, respectively. Specialties such as General Surgery, and Cardiothoracic Surgery showed the highest levels of awareness and knowledge, likely due to the frequent application of vessel sealers in complex procedures within these fields. This finding aligns with research by Schulze et al. (2018), who reported high adoption rates of advanced surgical technologies in specialties requiring precision and efficiency.

Perception of Vessel Sealers

The mean perception score of 4.00 indicates a generally positive view of vessel sealers. Specialties with higher perception scores, such as General Surgery and Cardiothoracic Surgery, reflect the effective integration of vessel sealers in their practices. These results are consistent with findings from a study by Thompson et al. (2019), which highlighted the positive reception of vessel sealers due to their ability to enhance surgical outcomes through reduced blood loss and improved haemostasis .

Interpretation of Results

Preference for Vessel Sealers

A notable 64% of surgeons preferred vessel sealers over traditional techniques. The primary factors influencing this preference were efficiency, precision, reduced blood loss, and safety. Conversely, those who preferred traditional techniques cited familiarity, cost, and training as major factors. This division in preference highlights the transitional phase in surgical practice, where modern technology is gaining traction despite some resistance due to established practices and cost concerns. A study by Wilson et al. (2021) also found similar patterns, with a significant shift toward modern surgical tools driven by their clinical advantages.

Experience and Clinical Outcomes

Most surgeons reported having 1 to 5 years of experience with vessel sealers, suggesting recent adoption of this technology. However, those with more experience, particularly 15–20 years, reported better clinical outcomes, indicating that prolonged use and familiarity with vessel sealers can lead to improved surgical results. This trend mirrors the findings of a study by Martinez et al. (2020), which demonstrated that surgeons with extensive experience in advanced technologies tend to achieve superior clinical outcomes.

Conclusion

This study illuminates surgeons' strong awareness and preference for vessel sealers over traditional techniques across diverse surgical specialties. Surgeons demonstrate robust knowledge and positive perceptions of vessel sealers, emphasizing benefits like enhanced efficiency, reduced blood loss, and improved safety. Challenges to adoption, including training gaps and cost concerns, warrant attention. Recommendations include ongoing training initiatives, cost-benefit analyses, and longitudinal studies to track outcomes and inform future healthcare policies. Overall, the findings underscore a shift toward advanced surgical technologies for optimizing patient care and surgical outcomes, urging continued research and strategic investments in healthcare technology.

