Seminar Presentation

Validation of a Task-Specific Scoring System for a Microvascular Surgery Simulation Model

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Group 3: Surgical Instruments for Robotic Microsurgery

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Overview

- Project overview
- Background information
- *Validation of a Task-Specific Scoring System for a Microvascular Surgery Simulation Model*
  - Methods
  - Results
- Application of paper to our project

Project Overview

- Integrating novel surgical instruments into the REMS for robot assisted microvascular anastomosis

- Analysis of effectiveness of tools by testing with both novice and experienced surgeons
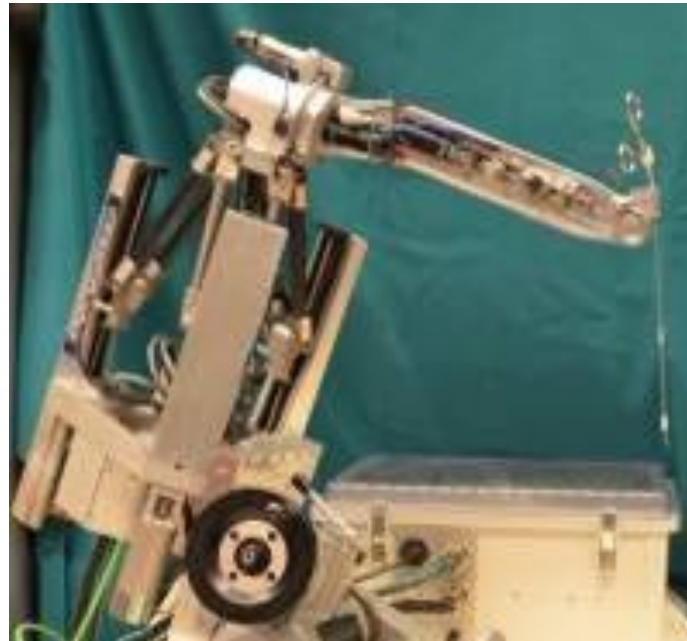
Background: Microvascular Anastomosis

- Process of surgically connecting two structures, in this case two micro-scale blood vessels

- Typically 8 – 10 loops around the circumference of the vessels

Validation of a Task-Specific Scoring System for a Microvascular Surgery Simulation Model

Nimmons, G., Chang, K., Funk, G., Shonka, D., & Pagedar, N. (2012). Validation of a Task-Specific Scoring System for a Microvascular Surgery Simulation Model. *The Laryngoscope,122*(10), 2164-2168.

- Validation paper on use of OSATS and chicken thigh model for evaluation of microvascular surgical technique

Motivation

- Microvascular surgery requires a technically advanced skill set
  - Vessels have diameter on the scale of 2 – 3 mm
  - Require eye-microscope-hand coordination
  - High dexterity for delicate tissues and fine, fluid motions
- Assessment of skills requires a uniform and objective assessment method
- Current available biologic training models require the use of live rats

Methods: Subjects

- 20 subjects of varying experience:
  - 1st to 5th year residents ⎤ Novice – Intermediate
  - Surgical fellows
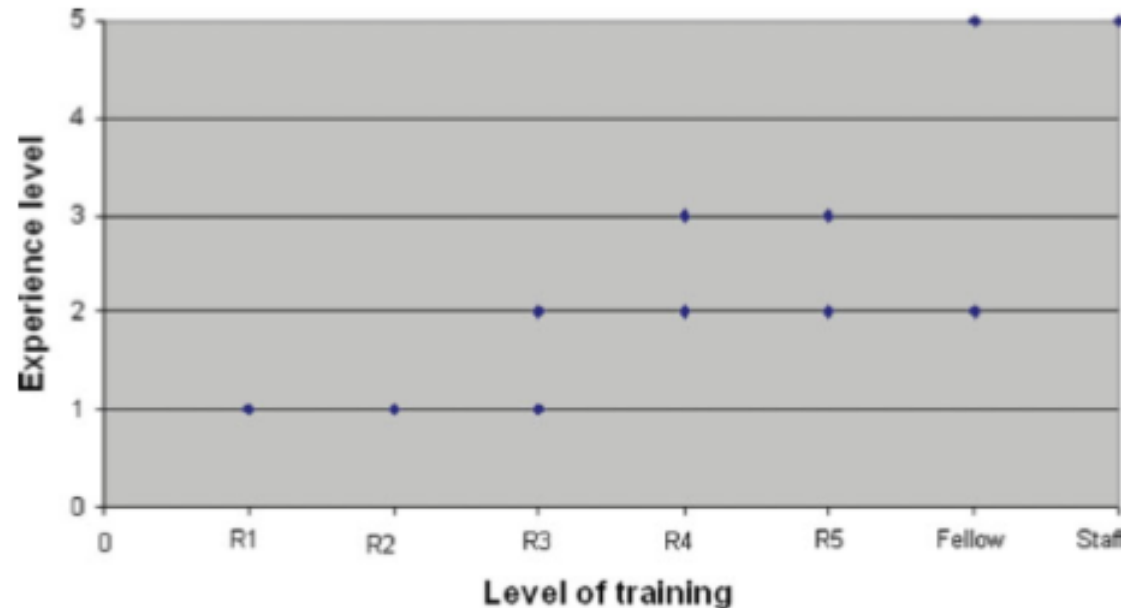 - Staff ⎦ Expert

Figure 1: Self reported experience level

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Methods: Evaluation

- OSATS: Objective Structured Assessment of Technical Skill

TABLE I.
Microvascular Objective Structured Assessment of Technical Skills (OSATS)-Task Specific Score.

	Correct	Incorrect
Passing needle through tissue		
1. Loads needle in drive 1/2 to 2/3 from needle tip		
2. Needle does not wobble in driver		
3. Needle enters tissue perpendicularly		
4. Forceps handle vessel adventitia to provide counter traction		
5. Dilator is appropriately used		
6. Needle is pulled through tissue following its curve		
7. Suture is pulled out parallel to the tissue		
8. Suture tails are left at the correct length		
9. Appropriate depth tissue bite on each side		
10. Sutures are spaced appropriately		
Knot tying		
11. Three or more square throws are tied		
12. Efficient handling of suture while tying		
13. Appropriate tension on suture while tying		
14. Tissue well-approximated but not strangulated		
Total correct	/14	

TABLE II.
Microvascular OSATS-Global Rating Scale.

	Worst				Best
Economy of motion	1	2	3	4	5
Instrument handling	1	2	3	4	5
Respect for tissue	1	2	3	4	5
Flow of operation	1	2	3	4	5
Overall result	1	2	3	4	5

Methods: Simulation Model

- Used ischiatic neurovascular bundle in chicken thigh

- Chicken thigh model provides similar structures to those in free flaps
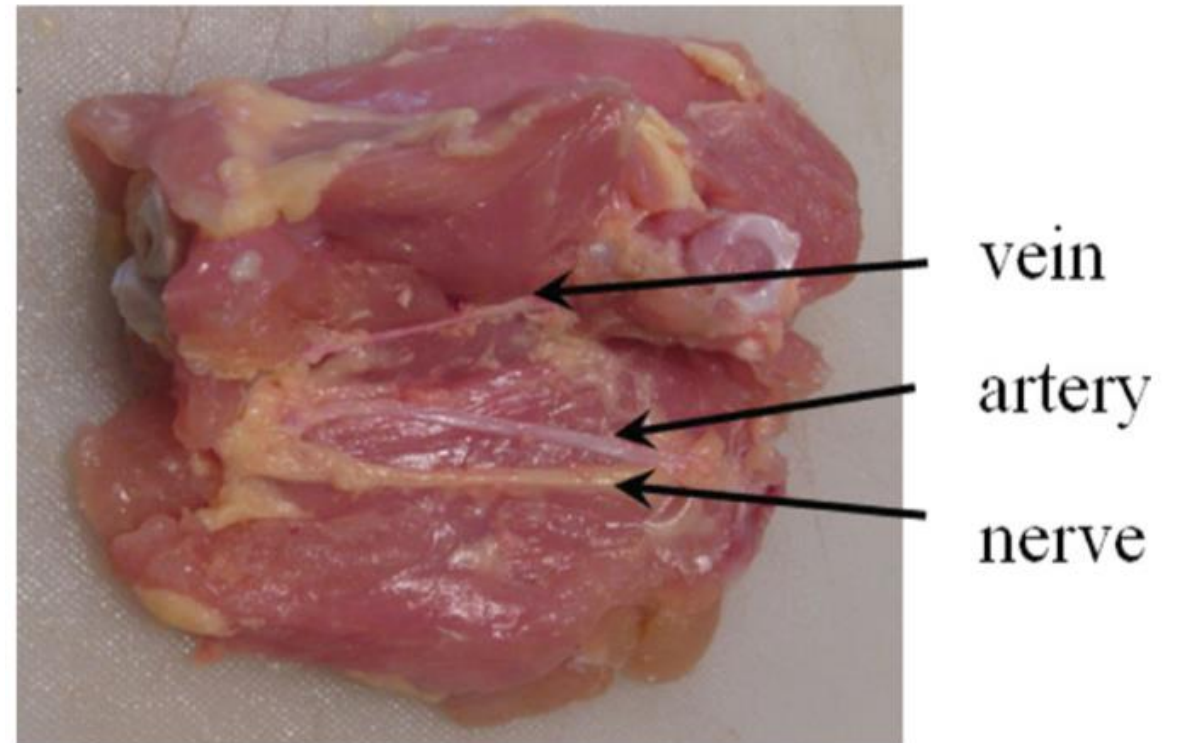
- Veins and arteries were skeletonized

vein

artery

nerve

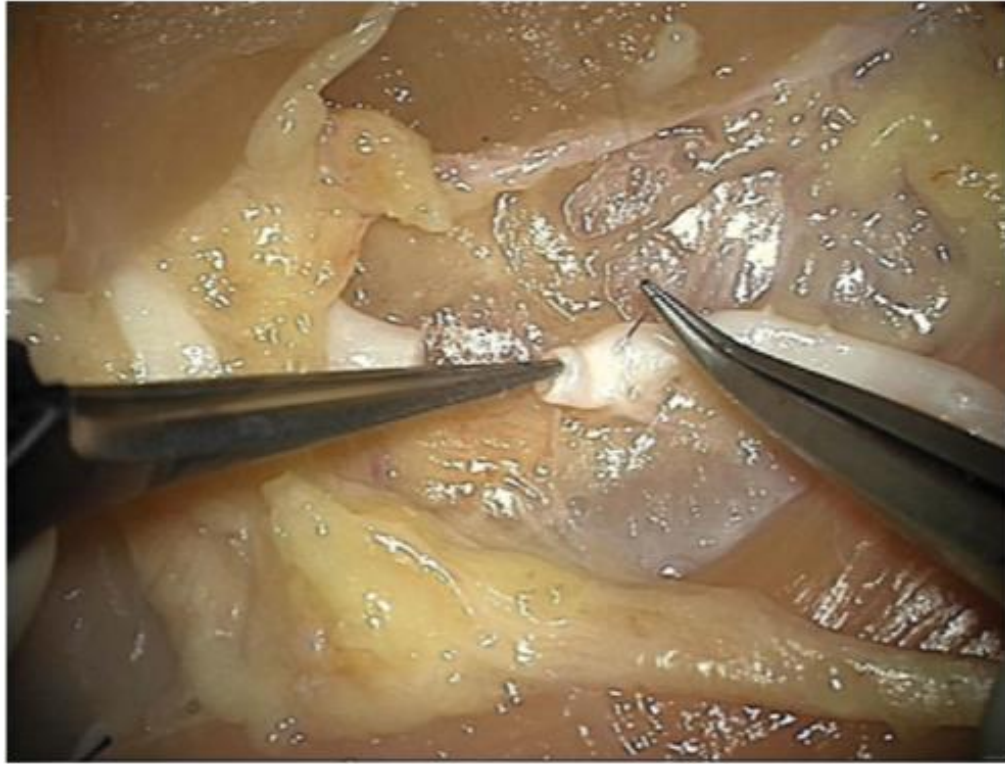**Figure 2:** Ischiatic neurovascular bundle

Methods

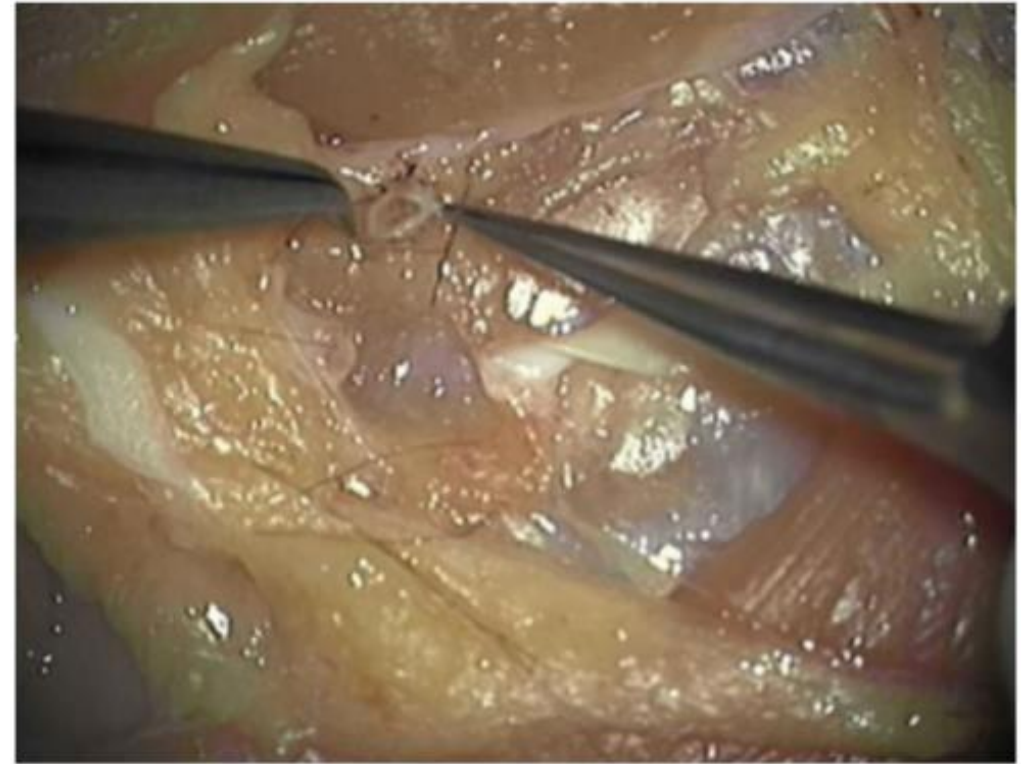**Figure 3:** Intraoperative pictures recorded from microscope

Figure 4: Excision of results for analysis

Results: Task Specific Scores
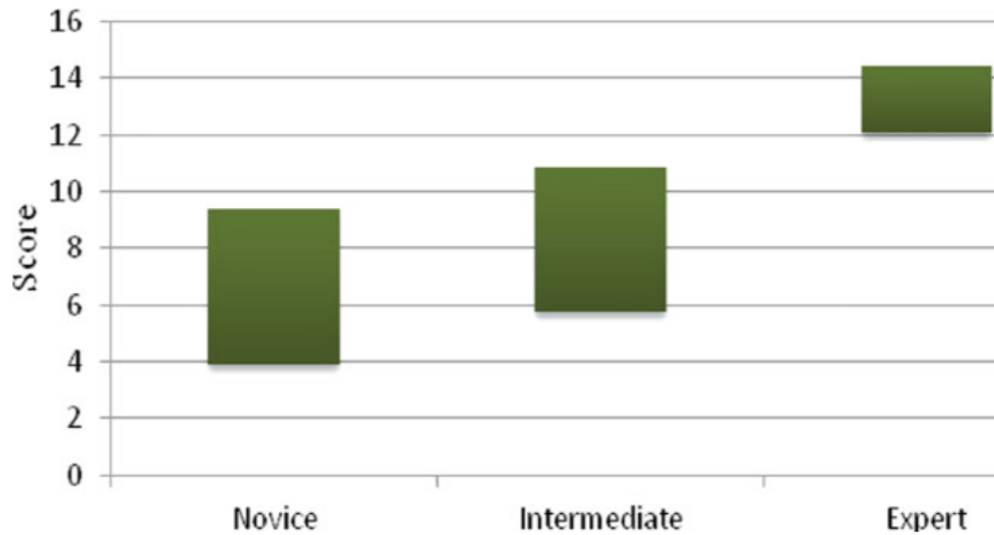

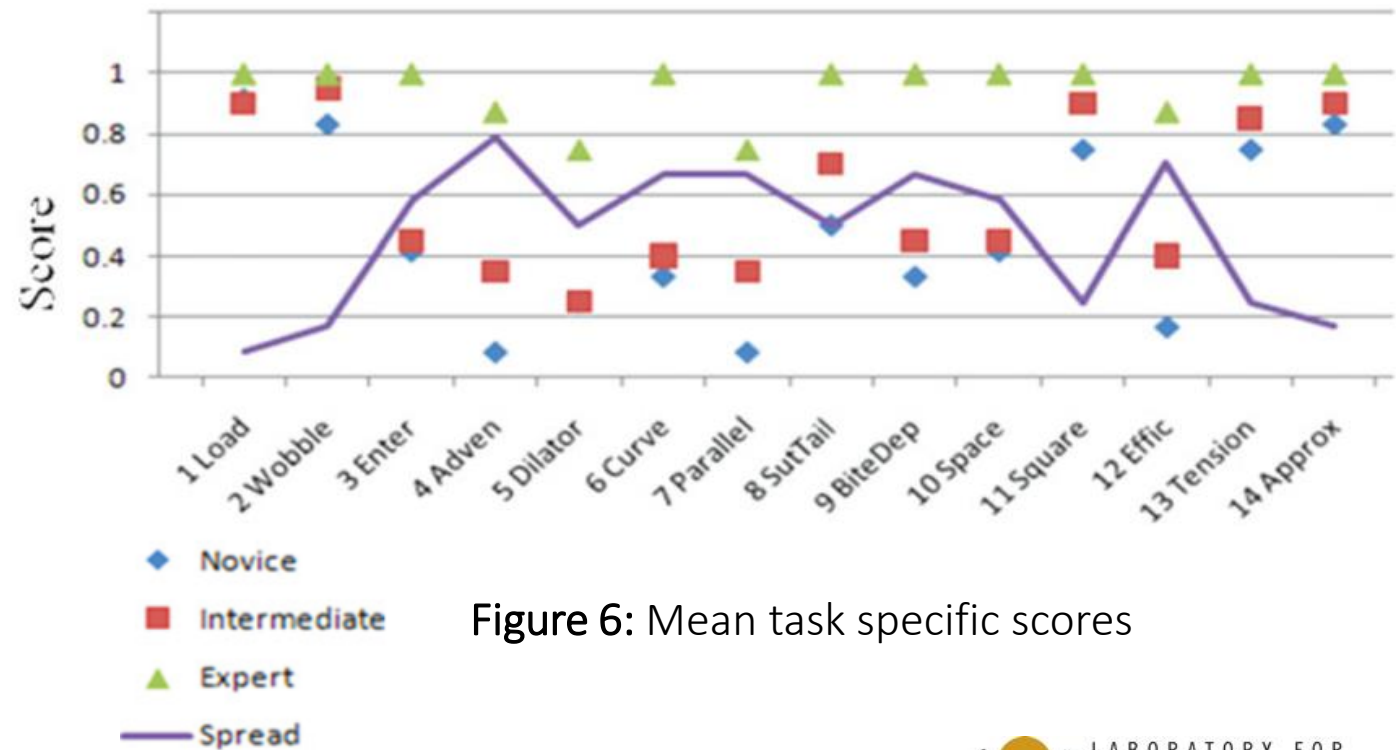**Figure 5:** Mean total task specific scores ±1 standard deviation

Figure 6: Mean task specific scores
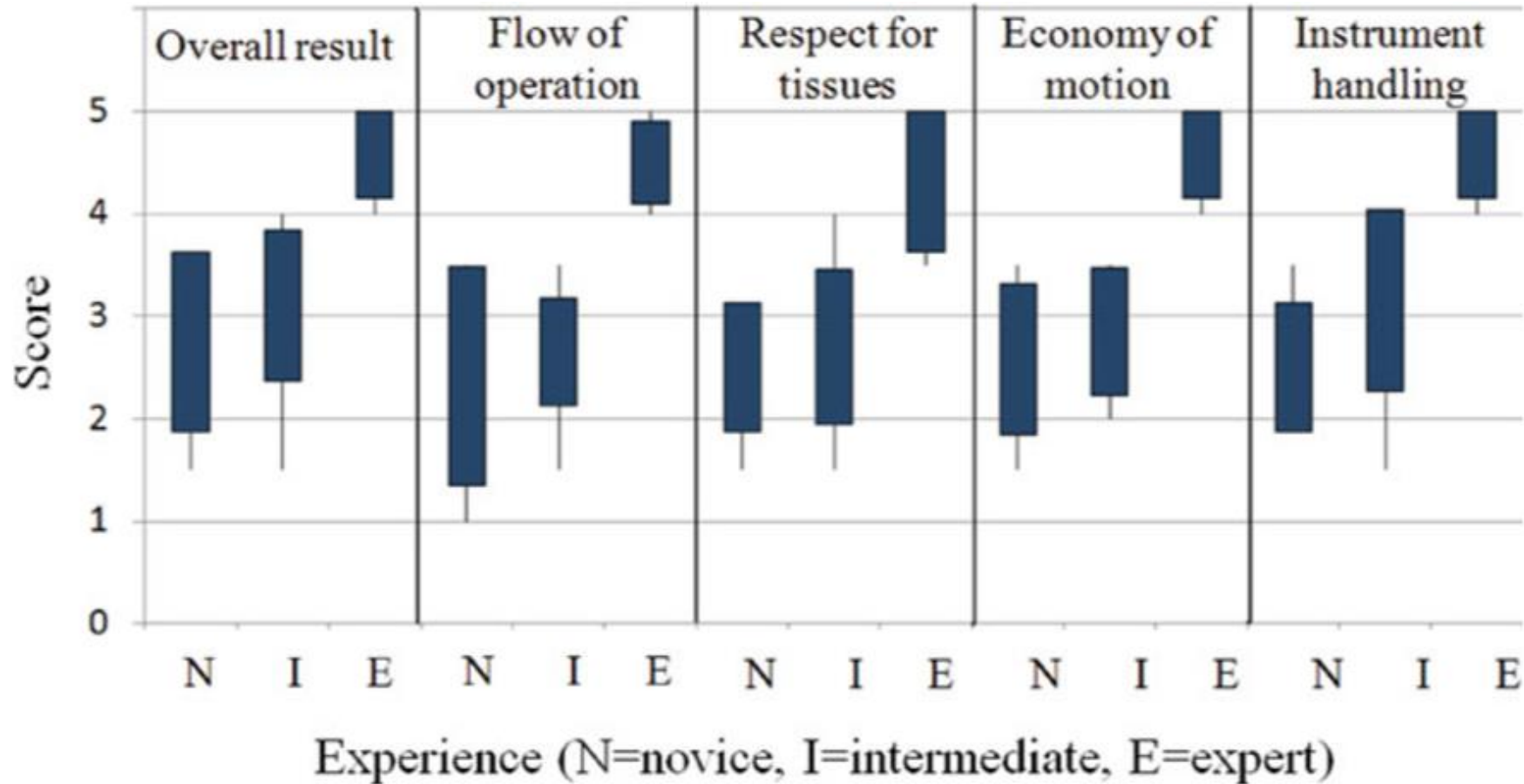
Results: Global Rating Scores

Figure 7: Mean global rating scores by experience
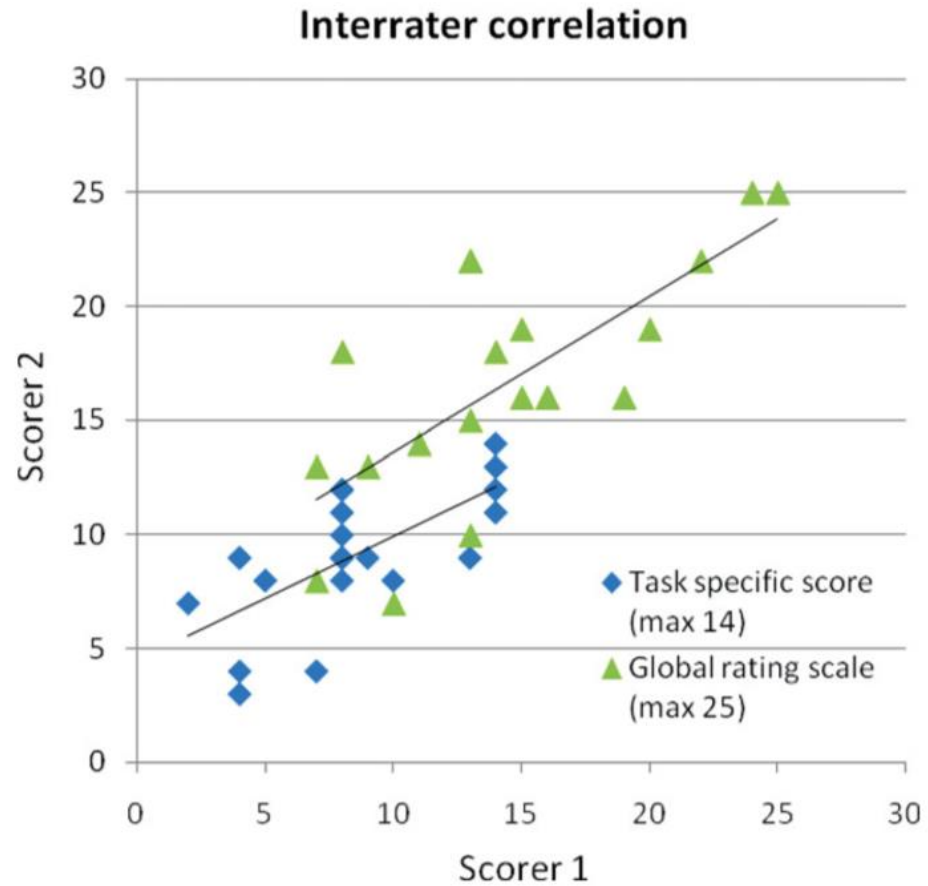
Results: Scoring

Figure 8: Correlation between scores of both graders

Task specific: 0.69
Global: 0.72
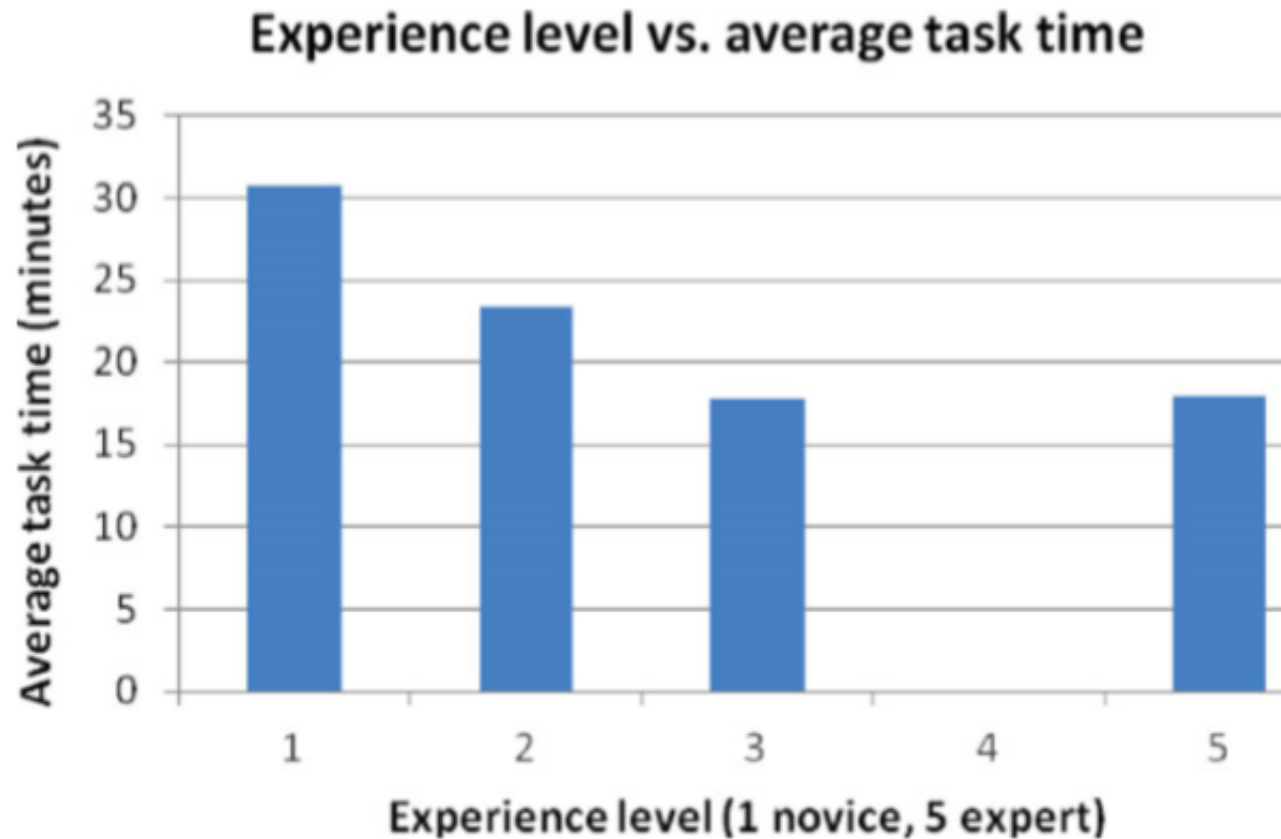
Results: Task Time

Figure 9: Task time with respect to experience level

Exhibits a logarithmic relationship

Time plateaus at 18 minutes

Conclusions

- Positive correlation between experience and scores, both task specific and global

- Experience level was logarithmically related to task time

- Validates the use of the chicken thigh model and OSATS as effective methods to teach and evaluate microvascular anastomosis

- Immediate feedback is not present

Paper Evaluation

Strengths

- Detailed description of methods
- Detailed analysis of results, both statistically and qualitatively
- Procedure is very similar to our own

Shortcomings

- Relied on self-evaluation of experience in microsurgery

Relevance to our project

- Similar procedure to what is being used to evaluate the REMS

- Differences:
    - Complete vs. abbreviated anastomosis
    - All subjects are assumed to be novices at task
    - Varying operation method, not experience level

Relevance to our project

- Validates use of ischiatic neurovascular bundle in chicken thigh as a model

- Provides objective criteria for procedure analysis

- Expecting:
  - Task specific scores to be low
  - Global scores will show improvement from manual to robotic surgery

Seminar Presentation

Analysis of Techniques in Microvascular Anastomosis

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