

Musculoskeletal stress and phacoemulsification: *Can surgeon-centered ergonomic designs be meaningful in the OR?*

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Purpose

Surgeons have a moderate risk of injuries due to improper ergonomics¹



17% of eye care physicians experience hand/wrist musculoskeletal stress (MSS)²



39% have lower back pain³

15% to 24% of ophthalmologists have limited their practice due to MSS⁴

One identified risk factor is the limited adjustability of surgical equipment⁵

This report will share the **preliminary clinical experience** of a **novel phacoemulsification** (phaco) **swivel handpiece** and **foot pedal** design which may **help mitigate** some **ergonomic burden** experienced during cataract surgery

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Methods

Ergonomic Designed Test Articles

Swivel Handpiece



Up to 220° rotation

Foot Pedal



*With and without heel insert
11° of total treadle travel
Reduced switch actuation force**

**Compared to competitor foot pedal metrics*

Preclinical Equipment Factors Evaluation¹

- 13 surgeon's evaluation of a novel phaco system
- Completing 2 simulated cataract surgeries on replica cataractous eyes of various densities
- Investigators completed post task subjective assessment

Methods

Clinical Study Design¹

- Prospective, open-label clinical study of a novel phaco system
- Investigators performed routine small-incision cataract surgery with the novel phaco system
- Investigators responded to a questionnaire regarding the performance of the phaco system
 - ◆preoperative
 - ◆day of surgery
 - ◆1-day post operative visits

Clinical Population



Age 22 or greater years of age with cataracts for which cataract extraction and posterior chamber IOL implantation have been planned

Clinical Endpoints



Overall performance and satisfaction rating of the swivel handpiece



Overall performance and satisfaction rating of the foot pedal

Results

Preclinical Subjective Assessment Results¹

? Question: How would you rate the **comfort of holding the handpiece & managing the tubing** during the procedure?

Likert scale: 1 = very comfortable to 6 = very uncomfortable

100% of surgeons reported comfortable use and easy management of swivel handpiece with tubing.

? Question: How would you rate the **level of fatigue in your foot after using the foot pedal**?

Likert scale: 1 = very fresh to 6 = very fatigued

100% of the surgeons reported that no foot fatigue was experienced after use.

Results

Clinical Questionnaire Results¹

2 surgeons, 58 cataract surgeries (41 subjects)

Surgeons rated satisfaction using a Likert scale of 1 – 5

- 1- unsatisfied
- 2- somewhat unsatisfied
- 3- neither satisfied nor unsatisfied
- 4- satisfied
- 5- very satisfied

Questionnaire Items	Cataract Status				n/N (eyes with ratings of 4 or 5/eyes treated)	% for rating of 4 or 5 (95% CI)
	Trace/Mild		Moderate/Severe			
	n	%	n	%		
Satisfaction with weight and size of swivel handpiece					47/50*	94.0% (0.83, 0.99)
Score of 3	1	4.3%	2	7.4%		
Score of 4 or 5	22	95.7%	25	92.6%		
Satisfaction with surgeon control of swivel handpiece					47/50*	94.0% (0.83, 0.99)
Score of 3	1	4.3%	2	7.4%		
Score of 4 or 5	22	95.7%	25	92.6%		
Overall foot pedal satisfaction					58/58	100.0% (0.94, 1.00)
Score of 4 or 5	27	100.0%	31	100.0%		
Satisfaction with enhanced foot pedal ergonomics					58/58	100.0% (0.94, 1.00)
Score 4 or 5	27	100.0%	31	100.0%		

*50 eyes were treated with the swivel handpiece

1. Study data on file: Johnson & Johnson Surgical Vision, Inc DOF2021OTH4002

Conclusion

The results of this study suggest :



Use of a novel phaco system with a swivel handpiece and ergonomically designed foot pedal may aid in reducing identified cataract surgeon musculoskeletal stress. Further ergonomic investigations are recommended.