

# Ultrasonic Shears Decrease Post-Operative Hematomas in Head & Neck Microvascular Reconstruction

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## Introduction

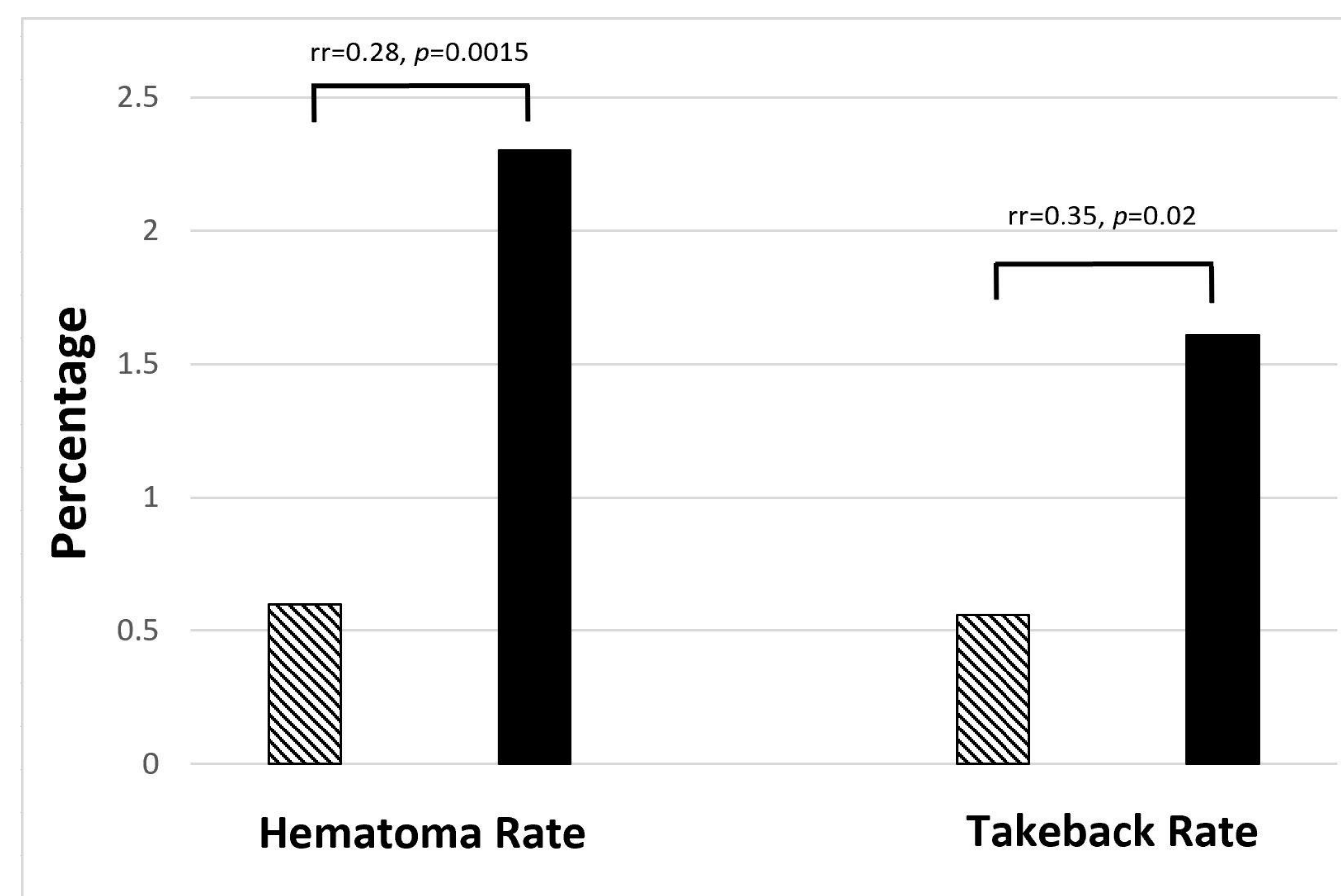
- Post-operative hematomas remain a significant complication following head and neck tumor resection and microvascular reconstruction
- The use of the ultrasonic blades and shears were first introduced by Amaral in 1994 for laparoscopic surgery<sup>5</sup>
- It utilizes high-frequency (55,500 Hz) energy that is able to cut tissues and seal blood vessels simultaneously.
- A number of studies have proven the efficacy of ultrasonic technology with regard to excellent hemostatic ability and safety in harvesting perforator flaps
- We sought to analyze the post-operative bleeding and hematoma rates in a large series of patients undergoing microvascular free tissue transfer. We then sought to determine if the adoption of ultrasonic shears led to a decrease in post-operative hematomas and surgical takebacks for bleeding.

## Materials and Methods

- This study was approved by the University of California Los Angeles Medical Institutional Review Board 1 Committee (IRB protocol ID#22-001513).
- Patients who underwent microvascular free flap reconstruction for head and neck defects between August 1995 and December 2022 were included.
- The cohort was divided into two groups, those undergoing dissection without ultrasonic shears (prior to August 2009) and those undergoing dissection with ultrasonic shears (since August 2009).
- Small blood vessels (external diameter <1.0-mm) were transected and sealed using ultrasonic shears on an output setting of 5.
- Large blood vessels (external diameter 1 – 3-mm) were transected and sealed using ultrasonic shears on an output setting of 3.
- Vessels having an external diameter of greater than 2-3 millimeters were ligated with silk ties or hemaclips.
- post-operative systemic aspirin (81mg/day) was given immediately at the conclusion of surgery and then daily for one week, unless contraindicated by allergic reaction or thrombocytopenia.
- Data was collected by the retrospective examination of inpatient and outpatient charts.
- Perioperative morbidity was defined as to occur within 30 days postoperatively, and complications occurring during this time period were recorded.
- The primary outcomes were hematoma formation and return to the operating room for bleeding or hematoma. A hematoma was defined clinically as a swelling and fluctuance at the surgical site and/or bleeding from the incision sites. Criteria for takeback at this institution are rapidly expanding neck hematoma, loss of doppler signal and concern for flap compromise, respiratory compromise, hemodynamic instability, or compartment syndrome at the donor site.
- We compared hematoma and takeback rates before and after the institution of ultrasonic shears.

Total cases	2288
Without shears	870 (38%)
With shears	1418 (62%)
Age (years)	62.4
Gender (M/F)	1479/809

**Table 1-** Demographics and characteristics of study population



**Figure 1 –** Comparison of Hematoma and Takeback Rates with and without the Use of Ultrasonic Shears  
Hematoma rate with and without ultrasonic shears was 0.6% and 2.3%, respectively. Takeback rate with and without ultrasonic shears was 0.56% and 1.61%, respectively. With the use of ultrasonic shears, the relative risk of hematoma formation is 0.28 (CI 95%, 0.13-0.61, p=0.0015). With the use of ultrasonic shears, the relative risk of takeback to the operating room for hematoma evacuation is 0.35 (CI 95%, 0.15-0.84, p=0.02).  
\*striped bars=with harmonic shears; solid bars=without harmonic shears

## Results

- A total of 2288 flaps were performed during the study time period (Table 1).
- The average age of patients undergoing free flap reconstruction was 62.4 years. There were 1479 males and 809 females in the study.
- The most common flaps performed were fibula, radial forearm, subscapular system, anterolateral thigh, and rectus abdominus.
- The number of patients undergoing surgery without ultrasonic shears was 870 (38%) versus 1418 patients (62%) with ultrasonic shears. The overall hematoma rate was 1.3% (29/2288) for the entire cohort.
- The post-operative hematoma rates with and without ultrasonic shears were 0.6% (9/1418) and 2.3% (20/870). **The relative risk of post-operative hematoma with the use of ultrasonic shears was 0.28 (CI 95%, 0.13-0.61, p=0.0015).**
- Of the 870 patients undergoing surgery without ultrasonic shears, 14 (1.61%) were taken back to the operating room for control of bleeding. Of the 1418 patients who underwent surgery with ultrasonic shears, 8 patients (0.56%) were taken back to the operating room for control of bleeding.
- **The risk of post-operative bleeding requiring operative intervention for cases without ultrasonic shears was 2.82 higher than for cases with shears (CI 95% 1.19-6.7, p=0.02).**

## Discussion & Conclusions

- The overall hematoma rate in the literature for head and neck reconstruction with free flaps ranges from 0.6% to 5.6%
- In our large series of patients undergoing microvascular reconstruction, overall hematoma rate was 1.3%. However, after the institution of ultrasonic shears, our hematoma rate significantly decreased to 0.6% (n=9/1418).
- One potential downside to ultrasonic shears relates to the cost of the devices. However, there are cost-effectiveness benefits to introducing ultrasonic shears, namely reducing OR takeback rates
- In our series, the takeback rate for hematoma was reduced from 1.61% to 0.56% with use of ultrasonic shears.

## References

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