# Aquablation Compared with Simple Prostatectomy for Prostate Volumes >80 Grams

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## Introduction

- Benign prostatic hyperplasia (BPH) is the most common benign urological disease in men.[1]
- Moderate-to-severe lower urinary tract symptoms (LUTS) from BPH affect 30% of men over 50[2] and medical treatment often fails for men with moderate-to-severe symptoms, leading them to seek surgical options.[3]
- Transurethral resection of the prostate (TURP) remains the gold standard for prostates less than 80 mL; simple prostatectomy (SP) remains the standard for larger prostates.
- Aquablation (Aqua) is a novel BPH procedure that may be used for both small and large prostates from 50 to 150 mL.[4]
- Although TURP has been compared with Aqua extensively, there is a gap in the literature regarding the direct comparison of Aqua to SP.
- SP, while a well-established operation, is an invasive procedure associated with a relatively high complication rate.[5,6]
- Aqua potentially offers an endoscopic solution for men with large prostates.

## Aims and Objectives

This study compares Aqua to simple prostatectomy (SP), analyzing functional urinary outcomes, adverse events (AE), and retreatment rates.

## Methods

- A single-institution retrospective chart review was conducted for men undergoing open/robotic SP or Aqua from 2017 to 2023 for prostates >80 mL.
- This retrospective study was approved by the institutional ethics committee (IRB # 2022-208).
- Data collected included blood transfusions, AE, retreatment rates, postoperative medication use, and International Prostate Symptom Score (IPSS) with quality-of-life (QOL) indicator.
- Inverse probability of treatment weighting (IPTW) was applied to address differences in baseline characteristics, including prostate size.
- Statistical analyses were performed using R 4.4.0.
- Results are IPTW-adjusted comparing SP to Aqua using Fischer's exact test and analysis of variance reported as beta (B) for continuous variables and odds ratios (OR) for categorical variables with 95% confidence intervals (CI).

**Figure 1**. *Aquablation handpiece with robotic arm*. The Aquablation system utilizes a robotic-assisted waterjet under ultrasound guidance to precisely resect prostate tissue for the treatment of BPH.[7]

## Results

- In total, 172 patients were studied: 111 Aqua and 61 SP.
- Groups were well-matched for body mass index (Aqua 28.77 vs SP 28).
- Aqua patients were older (73.04 vs 68.89), had smaller prostates (135.46 vs 186.53 mL), and lower preoperative urinary retention (21.8% vs 47.5%).
- Baseline characteristics between groups were adjusted using IPTW.
- SP outperformed Aqua in 1-year IPSS scores (B=–3.4, CI: -5.7,-1.1, p=0.005), whereas QOL was comparable (B=–0.46, CI:–1.3, 0.33, p=0.2).
- SP patients continued alpha-blockers less often postoperatively (B=-0.27, CI:–0.39,-0.41, p=0.001).
- SP showed higher blood transfusion rates (OR=4.22, CI: 1.64, 13.2, p=0.006), longer hospital stays (B=1.7, CI: 1.0, 2.4, p<0.001), and longer operating times (B= 119, CI: 101, 135, p<0.001).
- SP had lower retreatment rates (OR=0.46, CI: 0.23, 0.87, p=0.019).
- AE were not significantly different (p=0.8).

**Table 1. Preoperative Patient Demographics for Aquablation vs Simple Prostatectomy**

| | *All* (N = 172) | *Aquablation* (N = 111) | *Simple prostatectomy* (N = 61) | p |
|---|---|---|---|---|
| Race | | | | |
| White or Caucasian | *N* = 126 (73.3%) | *N* = 88 (79.3%) | *N* = 38 (62.3%) | **0.011** |
| Black or African American | *N* = 32 (18.6%) | *N* = 13 (11.7%) | *N* = 19 (31.1%) | |
| Asian | *N* = 7 (4.1%) | *N* = 4 (3.6%) | *N* = 3 (4.9%) | |
| Other | *N* = 7 (4.1%) | *N* = 6 (5.4%) | *N* =1 (1.6%) | |
| Ethnicity | | | | |
| Hispanic/Latino | *N* = 2 (1.2%) | *N* = 1 (0.9%) | *N* = 1 (1.6%) | 0.189 |
| Non-Hispanic/Latino | *N* = 145 (84.3%) | *N* = 92 (82.9%) | *N* = 53 (86.9%) | |
| Arab or Middle Eastern Descent | *N* = 6 (3.5%) | *N* = 2 (1.8%) | *N* = 4 (6.6%) | |
| Other | *N* = 18 (10.5%) | *N* = 15 (13.5%) | *N* = 3 (4.9%) | |
| Unknown | *N* = 1 (0.6%) | *N* = 1 (0.9%) | *N* = 0 | |
| Baseline characteristics | | | | |
| Age (years) | 71.56 (7.07) | 73.04 (6.03) | 68.89 (8.02) | **<0.001** |
| BMI (kg/m$^2$) | 28.78 (5.14) | 28.77 (5.64) | 28.81 (4.09) | 0.951 |
| ASA score | 2.58 (0.56) | 2.56 (0.55) | 2.61 (0.59) | 0.594 |
| Preop prostate volume (mL) | 153.57 (63.47) | 135.46 (49.15) | 186.53 (73.09) | **<0.001** |
| Preop retention | *N* = 52 (30.8%) | *N* = 24 (21.8%) | *N* = 28 (47.5%) | **<0.001** |
| Preop hemoglobin (g/dL) | 13.57 (2.01) | 13.79 (1.93) | 13.23 (2.09) | 0.092 |

Bold p-values are statistically significant based on α=0.05. Numbers represent mean values with standard deviation in parenthesis unless indicated otherwise. BMI=body mass index; preop=pre-operation.

## Results (cont'd)

**Table 2. Outcomes of Aquablation vs Simple Prostatectomy**

| | *All* (N = 172) | *Aquablation* (N = 111) | *Simple prostatectomy* (N = 61) |
|---|---|---|---|
| Surgical outcomes | | | |
| Length of stay (days) | 2.39 (2.35) | 1.61 (0.91) | 3.82 (3.32) |
| Operating time (minutes) | 103.64 (68.46) | 64.35 (22.0) | 179.46 (63.8) |
| Adverse events | *N* = 37 (21.5%) | *N* = 20 (18.0%) | *N* = 17 (27.9%) |
| Blood transfusion | *N* = 15 (8.8%) | *N* = 3 (2.7%) | *N* = 12 (20.0%) |
| Preop hemoglobin | 13.57 (2.01) | 13.79 (1.93) | 13.23 (2.09) |
| Hemoglobin decrease postop (g/dL) | 2.32 (1.84) | 1.9 (1.64) | 2.94 (1.94) |
| Surgical retreatment | *N* = 19 (11.2%) | *N* = 16 (14.5%) | *N* = 3 (5.1%) |
| International Prostate Symptom Score | | | |
| Preop | 18.38 (7.84) | 18.05 (7.94) | 19.56 (7.58) |
| 6 months postop | 7.69 (5.31) | 8.12 (5.41) | 4.11 (2.52) |
| 12 months postop | 6.49 (5.29) | 7.48 (5.44) | 2.94 (2.61) |
| Quality of life | | | |
| Preop | 3.7 (1.47) | 3.75 (1.48) | 3.4 (1.43) |
| 6 months postop | 1.92 (1.35) | 2.0 (1.36) | 1.13 (0.99) |
| 12 months postop | 1.56 (1.5) | 1.73 (1.54) | 0.64 (0.81) |
| Medication use 6 months postop | | | |
| ARI | *N* = 21 (12.4%) | *N* = 18 (16.4%) | *N* = 3 (5.1%) |
| Alpha-blocker | *N* = 34 (20.1%) | *N* = 31 (28.2%) | *N* = 3 (5.1%) |
| Postop Med | *N* = 44 (25.6%) | *N* = 39 (35.1%) | *N* = 5 (8.2%) |

Numbers represent mean values with standard deviation in parenthesis unless indicated otherwise. Med=medication; postop=post-operation.

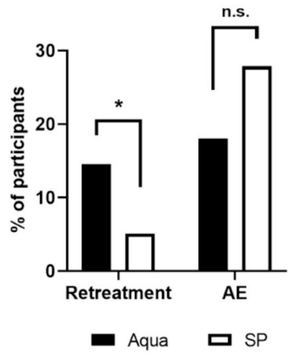



**Figure 2**. Trends in higher operative retreatment rates and lower adverse events seen in Aquablation compared with simple prostatectomy. The percentage of participants necessitating reoperation or experiencing an adverse event after Aqua or SP was reported. * p<0.05. Aqua= Aquablation; n.s.= not significant; SP= simple prostatectomy.

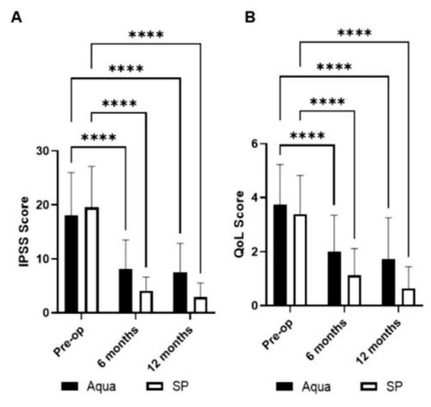
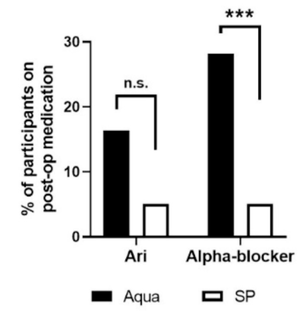



**Figure 3**. Urinary function subjective and objective improvements after Aquablation and simple prostatectomy. (A) IPSS and (B) QOL scores significantly reduced postoperatively (postop) for both surgical interventions, indicating symptom improvement. ****p < 0.0001. IPSS= International Prostate Symptom Score; QOL= quality of life.

## Results (cont'd)

**Figure 4**. Aquablation has higher postoperative 5-alpha reductase inhibitor (Ari) and alpha-blocker use compared with simple prostatectomy. Percent of men that were using Ari or alpha-blockers after Aqua and SP. ***p < 0.001.




## Conclusions

- Aqua outperformed SP for blood transfusions, hospital stay, and operative time.
- SP outperformed Aqua for retreatment rates, IPSS scores at 1-year follow-up, and reliance on alpha-blockers.
- Overall, Aqua is safe and effective in treating larger prostates, although with higher retreatment rates and IPSS scores at one year postoperatively when compared with SP.

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