

Intraoperative Cold Saline Irrigation for Pain in Transoral Robotic Surgery

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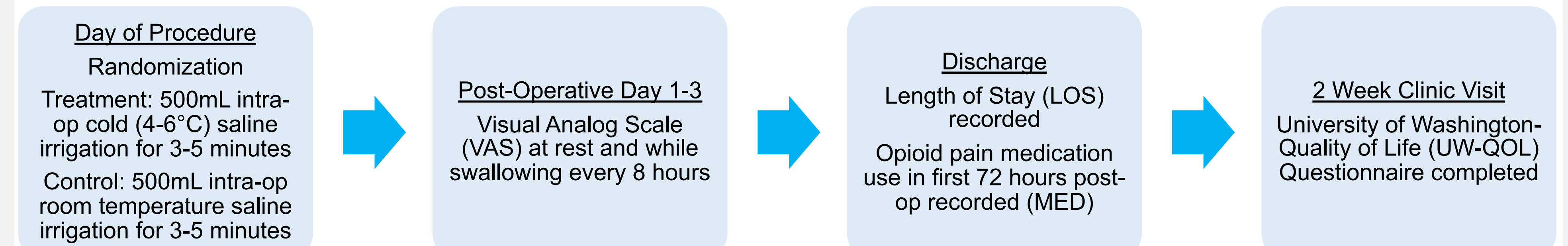
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BACKGROUND

- Burn inflammation and pain is mediated by capillary leaks, which contribute to edema and burn progression¹
- Basic science research has shown **treatment with cryotherapy** to mitigate the inflammatory process by decreasing the production of pain-inducing cytokines, rates of free radical creation, and macrophage invasion to the wound site²
- Clinically, **cold saline irrigation** has been used perioperatively for the past fifty years in attempts to mediate pain and prevent hematoma formation³
- Studies have shown **mixed results regarding its true clinical efficacy**, and few have assessed its effect on mucosal burns^{4,5}
- In tonsillectomy patients, **cold saline irrigation has been previously shown to decrease post-operative pain**⁶
- This randomized controlled trial proposes a **low-cost, low-risk method for mitigating the severe pain** often faced by patients following transoral robotic surgery for oropharyngeal lesions

METHODS

- This was a **prospective, single-blind, randomized controlled trial**
- **Inclusion:** Adults undergoing TORS resection of the tonsil or base of tongue using monopolar cautery, no history of chronic pain
- **Exclusion:** Chronic pain patients receiving opioids or pain management care, those receiving additional surgical procedures, pregnant patients, prisoners
- **Randomization:** Stratified by surgical site with computer-generated sequence assigning to control and treatment arms in 1:1 ratio
- **Intervention** was performed immediately after tissue removal by monocautery
- **Statistical Analysis:** Fisher exact test and Mann-Whitney U-Test



TABLES

Outcomes in Base of Tongue Group

Outcome Measure	Cold Saline	Control	p
N	9	9	
Pain at Rest (Median VAS)	14.7	31.9	0.112
Pain while Swallowing (Median VAS)	34.3	69.0	0.179
Pain Medication Used (Median MED)	33.5	37.5	0.562
Length of Stay (Median Days)	3.0	3.0	0.461
Quality of Life (Median UW-QOL)	75.0	59.5	0.022*
Abbreviations: VAS, Visual Analog Scale; MED, Morphine Equivalent Dose; UW-QOL, University of Washington Quality of Life Questionnaire			

Outcomes in Tonsil Group

Outcome Measure	Cold Saline	Control	p
N	6	7	
Pain at Rest (Median VAS)	35.1	13.3	0.138
Pain while Swallowing (Median VAS)	49.3	39.4	0.768
Pain Medication Used (Median MED)	60.0	43.5	0.615
Length of Stay (Median Days)	3.0	4.0	0.114
Quality of Life (Median UW-QOL)	74.5	67.0	0.907
Abbreviations: VAS, Visual Analog Scale; MED, Morphine Equivalent Dose; UW-QOL, University of Washington Quality of Life Questionnaire			

RESULTS

- The study population comprised 31 patients, with 9 belonging to the base of tongue treatment group, 9 the base of tongue control group, 6 the tonsil treatment group, and 7 the tonsil control group
- **The base of tongue treatment group had lower median VAS scores than the control group** at rest (14.7 vs. 31.9, $p = 0.112$) and while swallowing (34.3 vs. 69.0, $p = 0.179$), but **these results did not achieve statistical significance**
- **The base of tongue treatment group had statistically significantly higher median UW-QOL scores than the control group** (75.0 vs. 59.5, $p = 0.022$)
- No significant differences were found between base of tongue groups in post-operative opioid use or length of stay
- No significant differences were found between tonsil groups on any of the four outcome measures

CONCLUSIONS

- These findings suggest that cold saline irrigation does not provide significant benefit in postoperative pain for patients undergoing TORS for tonsillectomy
- There may be potential benefits, particularly in quality of life, for base of tongue patients, and small sample sizes may have masked the ability of other measures to achieve statistical significance
- Further studies are necessary to assess optimal interventions for pain control and quality of life outcomes in TORS patients

REFERENCES

1. Wright, E. H., A. L. Harris, and D. Furniss. 2015. "Cooling of Burns: Mechanisms and Models." *Burns: Journal of the International Society for Burn Injuries* 41 (5):882–89. <https://doi.org/10.1016/j.burns.2015.01.004>.
2. Vieira Ramos, Gracielle, Clara Maria Pinheiro, Sabrina Peviani Messa, Gabriel Borges Delfino, Rita de Cássia Marqueti, Tania de Fátima Salvini, and Joao Luiz Quagliotti Durigan. 2016. "Cryotherapy Reduces Inflammatory Response Without Altering Muscle Regeneration Process and Extracellular Matrix Remodeling of Rat Muscle." *Scientific Reports* 6 (January):18525. <https://doi.org/10.1038/srep18525>.
3. Kasdan, M. L., and J. R. Chipman. 1987. "Dupuytren's Contracture: Wound Irrigation to Prevent Hematoma." *Orthopaedic Review* 16 (8):525–28.
4. Louise Fincher, A., G. William Woods, and Daniel P. O'Connor. 2004. "Intraoperative Arthroscopic Cold Irrigation Solution Does Not Affect Postoperative Pain and Swelling." *Journal of Athletic Training* 39 (1):12–16.
5. Adie, Sam, Justine M. Naylor, and Ian A. Harris. 2010. "Cryotherapy after Total Knee Arthroplasty a Systematic Review and Meta-Analysis of Randomized Controlled Trials." *The Journal of Arthroplasty* 25 (5):709–15. <https://doi.org/10.1016/j.arth.2009.07.010>.
6. Shin JM, Byun JY, Baek BJ, Lee JY. Effect of cold-water cooling of tonsillar fossa and pharyngeal mucosa on post-tonsillectomy pain. *Am J Otolaryngol*. May-Jun 2014;35(3):353-6. doi:10.1016/j.amjoto.2014.01.005