

Sutured Arthroscopic Portal Closure to Improve Intraoperative Visibility – A Technical Note

Dr Rachel Price¹, Associate Professor Kenneth Cutbush^{1,3,4,5}, Professor Ashish Gupta^{1,2,3}

1. Queensland Unit for Advanced Shoulder Research (QUASR), Queensland University of Technology, Brisbane, Australia
2. Greenslopes Private Hospital, Brisbane, Australia
3. Australian Shoulder Research Institute, Brisbane
4. School of Surgery, University of Queensland, Brisbane, Australia.
5. Kenneth Cutbush Shoulder Clinic, Brisbane, Australia

Disclosures

Kenneth Cutbush and Ashish Gupta gratefully acknowledge funding from the Australian Research Council through the Industrial Transformation Training Centre for Joint Biomechanics (IC190100020) and its associated industry partners. Cash contributing partners include Stryker, Zimmer Biomet, Logemas, and Australian Biotechnologies.

Kenneth Cutbush reports the following disclosures; paid or unpaid consultant: Arthrex Inc., DePuy Synthes, Johnson & Johnson Company, Smith & Nephew, Zimmer. Share ownership: Tetrous Inc. Scientific Secretary of the Australian Orthopaedic Association. This author, their immediate family, and any research foundation with which they are affiliated did not receive any financial payments or other benefits from any commercial entity related to the subject of this presentation.

Ashish Gupta is CEO of Akunah Medical Technology Pty Ltd, Consultant for Zimmer Biomet, Healthium Medtech; Tetous Inc, Director of the Australia Shoulder Research Institute (ASRI) Funding From Stryker, Zimmer Biomet Arthrex, Director of Queensland Unit for Advanced Shoulder Research (QUASR founding) at the Queensland University of Technology. QUASR receives funding form the Australian Research Council (Grant ID IC190100020), QUT, Stryker, Zimmer Biomet, Australian Biotechnologies, Materialise and Akunah. This author holds the following Stock Options – Akunah Inc , Tetrous Inc. This author, their immediate family, and any research foundation with which they are affiliated did not receive any financial payments or other benefits from any commercial entity related to the subject of this presentation.

The remaining authors and the research foundations with which they are affiliated did not receive any financial payments or other benefits from any commercial entity related to the subject of this presentation.

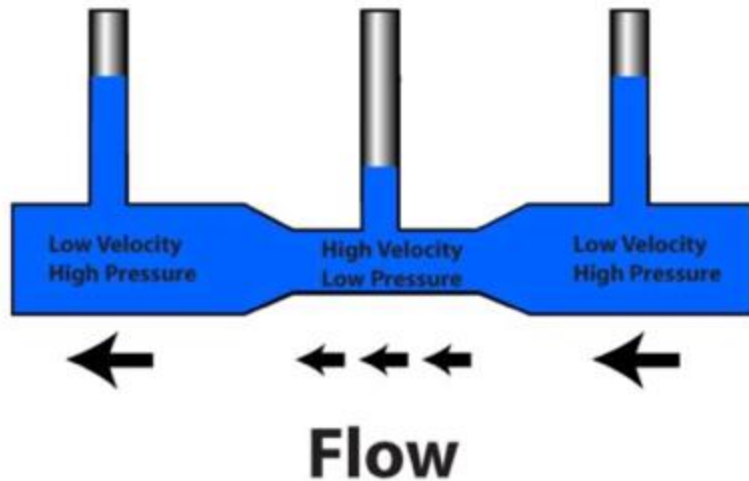
Introduction

- Visualisation is paramount for safe and efficient arthroscopic surgery
- Techniques to control visualisation can have negative aspects
 - Lowing blood pressure – stroke
 - Radiofrequency ablation – time consuming
 - Adrenaline in fluid – cost
 - Portal cannulas – crowding
- Rapid outflow through portals can cause bleeding and turbulence¹

1. Burkhart, S., Danaceau, S., Athanasiou, K. Turbulence control as a factor in improving visualization during subacromial shoulder arthroscopy. Arthroscopy: The Journal of Arthroscopic & Related Surgery. Volume 17, Issue 2, (2001)

Bernoulli effect

- Negative pressure gradient occurring perpendicular to high flow creating suction effect
- Increased bleeding due to pressure gradient



- **Controlling this outflow through non-cannulated portals leads to improved visualization without having to cauterize bleeding**

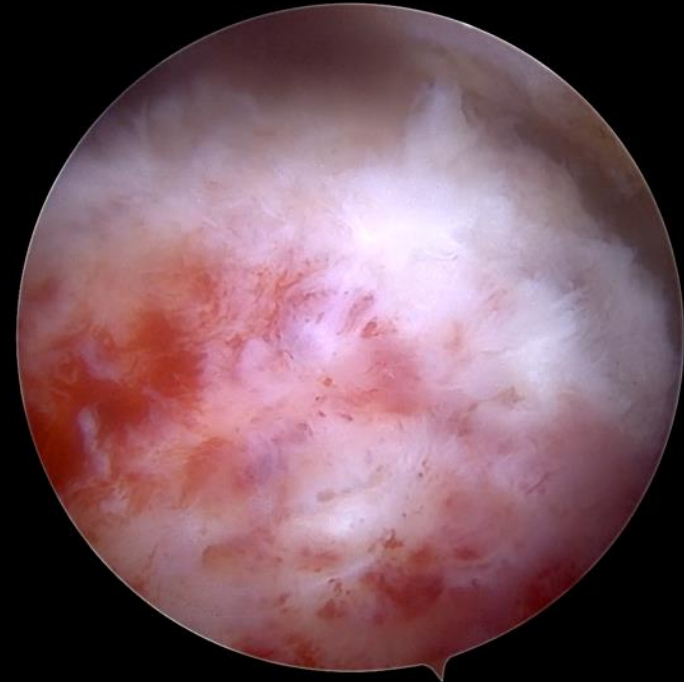
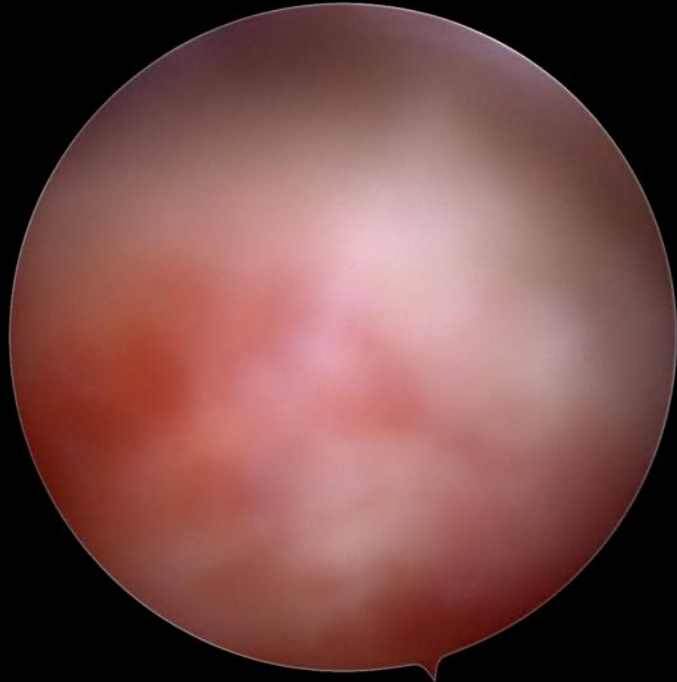
Technique

- For portals with high outflow
 1. 1 Ethilon™ suture
 2. Large full-thickness bites – ensuring to pass through dermis
 3. Tie slip knot by not changing posts and tightening adequately to restrict flow
 4. Tie further square knot to lock position



Before

After



Important techniques to improve visualisation

- Blood pressure – careful monitoring, avoiding transient drops, regional anaesthesia²
- Pump pressure – increasing pump pressure can worsen bleeding with increased flow and pressure differential, therefore important to control flow
 - Aim for difference $\sim 50\text{mmHg}$ with SBP + short bursts of increased pressure as required to avoid excessive extravasation³

2. Yadeau JT, Liu SS, Bang H, et al: Cerebral oximetry desaturation during shoulder surgery performed in a sitting position under regional anesthesia. Can J Anaesth 2011;58(11):986-992.

3. Morrison DS, Schaefer RK, Friedman RL. The relationship between subacromial space pressure, blood pressure, and visual clarity during arthroscopic subacromial decompression. Arthroscopy. 1995

Important techniques to improve visualisation

- Balance using RF and other techniques to improve efficiency
- Adrenaline in fluid – improves clarity and lower pump pressure but not required if consider other factors. Marked increase in cost^{4, 5}

4. Stetson WB, Morgan SA, Polinsky S, Chung B, Hung NJ. Cost Effective Technique of Shoulder Arthroscopy Without the Use of Epinephrine in Irrigation Solution. *Arthrosc Tech.* 2021 Jan 30;10(2):e411-e418

5. Kuo LT, Chen CL, Yu PA, et al. Epinephrine in irrigation fluid for visual clarity in arthroscopic shoulder surgery: a systematic review and meta-analysis. *International Orthopaedics.* 2018 Dec;42(12):2881-2889

Conclusion

- Previous methods controlling Bernoulli effect
 - Digital pressure – ties up assistant, preventing use in other aspects of case¹
 - Plastic cannula into port – time removing/replacing when using port⁶
 - Cannula – difficult to work around, particularly with multiple port sites, costly
- Portal dermal apposition with suture as described leads to controlled flow, improved visualization and easy use of portal without having to remove instruments from the port site.

1. Burkhart, S., Danaceau, S., Athanasiou, K. Turbulence control as a factor in improving visualization during subacromial shoulder arthroscopy. Arthroscopy: The Journal of Arthroscopic & Related Surgery. Volume 17, Issue 2, (2001)

6. Theivendran K, Shah MM. A simple and cost-effective technique to prevent turbulence and improve visualisation during shoulder arthroscopy. Ann R Coll Surg Engl. 2011 May;93(4):324-5

References

- 1. Burkhart, S., Danaceau, S., Athanasiou, K. Turbulence control as a factor in improving visualization during subacromial shoulder arthroscopy. Arthroscopy: The Journal of Arthroscopic & Related Surgery. Volume 17, Issue 2, (2001)
- 2. Yadeau JT, Liu SS, Bang H, et al: Cerebral oximetry desaturation during shoulder surgery performed in a sitting position under regional anesthesia. Can J Anaesth 2011;58(11):986-992.
- 3. Morrison DS, Schaefer RK, Friedman RL. The relationship between subacromial space pressure, blood pressure, and visual clarity during arthroscopic subacromial decompression. Arthroscopy. 1995
- 4. Stetson WB, Morgan SA, Polinsky S, Chung B, Hung NJ. Cost Effective Technique of Shoulder Arthroscopy Without the Use of Epinephrine in Irrigation Solution. Arthrosc Tech. 2021 Jan 30;10(2):e411-e418
- 5. Kuo LT, Chen CL, Yu PA, et al. Epinephrine in irrigation fluid for visual clarity in arthroscopic shoulder surgery: a systematic review and meta-analysis. International Orthopaedics. 2018 Dec;42(12):2881-2889
- 6. Theivendran K, Shah MM. A simple and cost-effective technique to prevent turbulence and improve visualisation during shoulder arthroscopy. Ann R Coll Surg Engl. 2011 May;93(4):324-5

Collaborate with QUASR

Contact us at the Queensland Unit for Advanced Shoulder Research
Queensland University of Technology.

E: research@kennethcutbush.com

