

# Non-selective NSAIDs provide good clinical outcomes and do not increase retear rates post-arthroscopic rotator cuff repair: A systematic review and meta-analysis

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# Disclosure

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The authors have no conflict of interest to declare

# Background

- NSAIDs are one of the **most commonly used** oral medications
- However, its effect on postoperative tendon healing has been controversial
- Several animal studies have shown that NSAIDs have negative effects on tendon-to-bone healing
  - Cohen et al: NSAID impaired RC tendon healing in rat model
  - Connizzo et al: Ibuprofen most detrimental to supraspinatus tendon when given animals immediately post operatively
- Ekhtiari et al: While opioid prescription is a significant issue, many surgeons are concerned about the effects of NSAIDs on bone healing rates



# Study Aims and Hypotheses

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- To investigate the effect of NSAIDs on **retear rates** and **clinical outcomes** such as pain and functional scores post arthroscopic rotator cuff repair
- We hypothesize that NSAIDs **do not increase retear rates** and offers better pain and functional outcomes than a non-NSAIDs regime

# Methods

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- Four databases were searched for articles comparing outcomes of cohorts with and without NSAIDs use in the post arthroscopic rotator cuff repair pain regime.
- Meta-analysis was conducted for early (<3 months) and late (>12 months) post-operative pain scores, Functional scores (ASES), as well as retear rates.

# Study Characteristics

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- A total of **6 studies** were included
- Total baseline cohort size was **916**, with **443** (48.3%) in the NSAIDs group and **473** (51.6%) in the control group
- No significant difference in baseline characteristics between the groups

# Study Characteristics

| Study         | Follow up  | Comparison                       | Rescue Medication   |
|---------------|------------|----------------------------------|---|
| Tang et al    | 12 months  | ibuprofen vs. placebo            | Both received standard prescription of hydrocodone/acetaminophen taken PRN                              |
| Siva et al    | 7.5 months | Ketorolac vs. No ketorolac       | Both group received prescription of Oxycodone/acetaminophen PRN for moderate to severe pain             |
| Oh et al      | 24 months  | Celecoxib/ibuprofen vs. tramadol | Oxycodone given to all patients as rescue medication  |
| Burns et al   | 12 months  | Celecoxib vs. Placebo            | Opioids given in both groups (oxycodone/acetaminophen, tramadol, hydrocodone/acetaminophen and codeine) |
| Kraus et al   | 24 months  | Ibuprofen vs. no ibuprofen       | Opioid medication as needed   |
| Rouhani et al | 2 days     | Celecoxib vs. no celecoxib       | Acetaminophen 500mg/Hydrocodone 5mg tablet when needed  |

# Summary of Meta-analysis

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- There were **no significant differences** observed between the two groups in terms of VAS scores (both early and late), functional score, or retear rates. (p-value >0.05)
- Due to a relatively high degree of heterogeneity in the analysis of retear rates ( $I^2 = 61\%$ ), a subgroup analysis was conducted to evaluate if the inclusion of COX-2 selective inhibitor could affect retear rates.
- When comparing subgroups, it was observed that the use of COX-2 selective NSAIDs was associated with significantly higher retear rates compared to the group that did not. ( $P < 0.01$ )



# Results – Subgroup analysis (Cox-2 vs. Non-Selective)

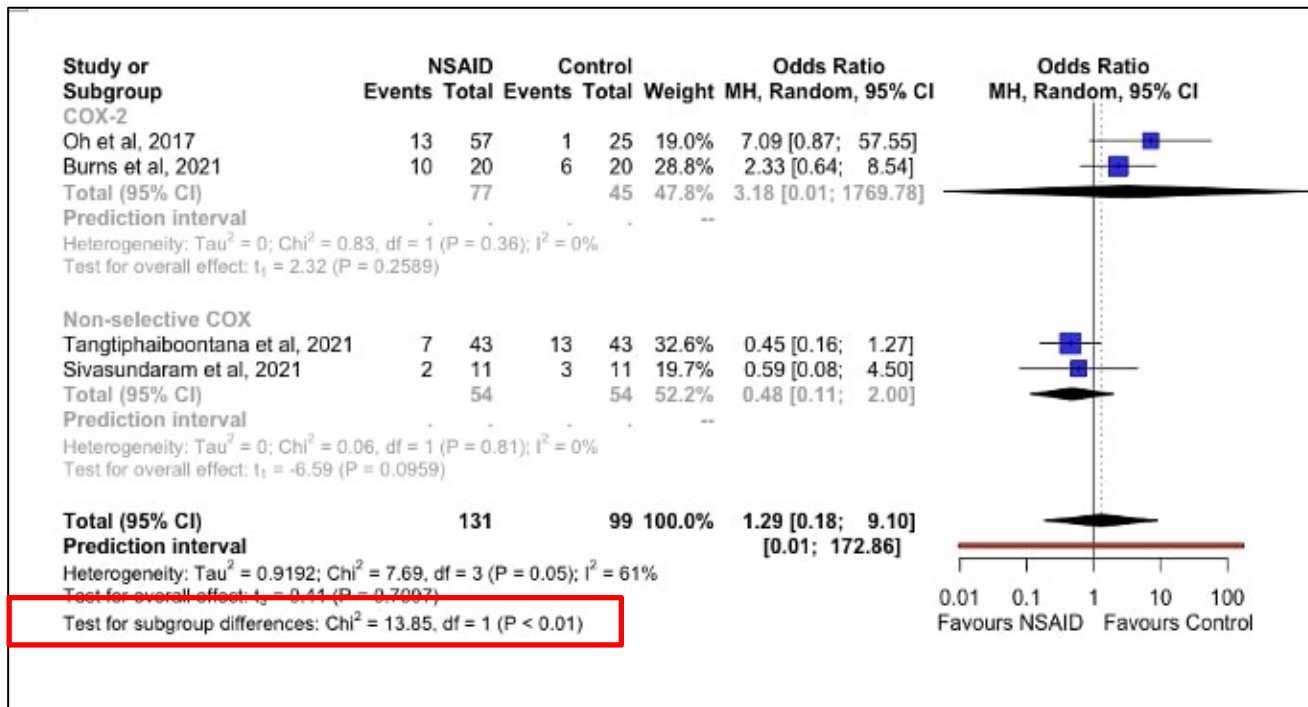


Fig 5: Subgroup analysis of retear rates

# Discussion

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- Retear rates after arthroscopic RCR are **multifactorial** and can vary from 4-78%
- While controversial, there is a **lack of prospective clinical trials** showing that NSAIDs impair rotator cuff recovery and our study has shown that NSAID does not increase retear rates
- However, subgroup analysis showed that **COX-2 inhibitor** (Celecoxib) is associated with higher retear rates
- Su et al: There is a dose-dependent inhibition of fracture healing by Celecoxib. Non-selective NSAIDs **delay rather than inhibit** fracture healing
- Tang et al, Siva et al: The usage of NSAIDs has **reduced opioid usage**

# Limitations

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- Heterogeneity to the type of NSAIDs included
  - Attempts were made to differentiate **non-selective NSAIDs** and **COX-2 selective NSAIDs**
- Heterogeneity in the diagnosis of re-tear
- Only evaluated postoperative use of NSAIDs

# Conclusion

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- NSAIDs play an **important role** in the recently popularized multimodal pain management approach aimed at **reducing opioid usage**
- We found that non-selective NSAIDs usage is **safe and effective and does not increase retear rates**
- However, selective COX-2 inhibitors **should be used with caution** as they may potentially interfere with healing process, leading to higher retear rates



# References

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- [1] Cohen DB, Kawamura S, Ehteshami JR, Rodeo SA. Indomethacin and celecoxib impair rotator cuff tendon-to-bone healing. *Am J Sports Med.* 2006;34(3):362-9.
- [2] Connizzo BK, Yannascoli SM, Tucker JJ, Caro AC, Rigglin CN, Mauck RL, et al. The detrimental effects of systemic Ibuprofen delivery on tendon healing are time-dependent. *Clin Orthop Relat Res.* 2014;472(8):2433-9.
- [3] Ekhtiari S, Horner NS, Shanmugaraj A, Duong A, Simunovic N, Ayeni OR. Narcotic Prescriptions following Knee and Shoulder Arthroscopy: A Survey of the Arthroscopy Association of Canada. *Cureus.* 2020;12(4):e7856.
- [4] Tangtiphaiboontana J, Figoni AM, Luke A, Zhang AL, Feeley BT, Ma CB. The effects of nonsteroidal anti-inflammatory medications after rotator cuff surgery: a randomized, double-blind, placebo-controlled trial. *J Shoulder Elbow Surg.* 2021;30(9):1990-7.
- [5] Sivasundaram L, Mengers S, Trivedi NN, Strony J, Salata MJ, Voos JE, et al. Oral Ketorolac as an Adjuvant Agent for Postoperative Pain Control After Arthroscopic Rotator Cuff Repair: A Prospective, Randomized, Controlled Study. *J Am Acad Orthop Surg.* 2021;29(24):e1407-e16.
- [6] Burns KA, Robbins LM, LeMarr AR, Childress AL, Morton DJ, Wilson ML. Healing rates after rotator cuff repair for patients taking either celecoxib or placebo: a double-blind randomized controlled trial. *JSES Int.* 2021;5(2):247-53.
- [7] Kraus NR, Garvey KD, Higgins LD, Matzkin E. Ibuprofen Use Did Not Affect Outcome Metrics After Arthroscopic Rotator Cuff Repair. *Arthroscopy, Sports Medicine, and Rehabilitation.* 2021;3(2):e491-e7.
- [8] Rouhani A, Tabrizi A, Elmi A, Abedini N, Mirza Tolouei F. Effects of preoperative non-steroidal anti-inflammatory drugs on pain mitigation and patients' shoulder performance following rotator cuff repair. *Adv Pharm Bull.* 2014;4(4):363-7.
- [9] Su B, O'Connor JP. NSAID therapy effects on healing of bone, tendon, and the enthesis. *J Appl Physiol* (1985). 2013;115(6):892-9.
- [10] Oh JH, Seo HJ, Lee YH, Choi HY, Joung HY, Kim SH. Do Selective COX-2 Inhibitors Affect Pain Control and Healing After Arthroscopic Rotator Cuff Repair? A Preliminary Study. *Am J Sports Med.* 2018;46(3):679-86.