A Multimodal Pain Protocol to Diminish Opioid Use Following Arthroscopic Rotator Cuff Repair

Michael J. Sayegh[1,2], Camille Pinpin[2], Eric V. Neufeld[1,2], Matthew Partan[2,3], Randy M. Cohn[4], Steven E. Rokito[1]

[1]Department of Orthopaedic Surgery, Northwell Health Long Island Jewish Medical Center/North Shore University Hospital, Donald and Barber Zucker School of Medicine at Hofstra/Northwell, New Hyde Park, NY.

[2]Donald and Barbara Zucker School of Medicine at Hofstra/Northwell, Hempstead, NY

[3]Department of Orthopaedic Surgery, Northwell Health Huntington Hospital, Huntington, NY

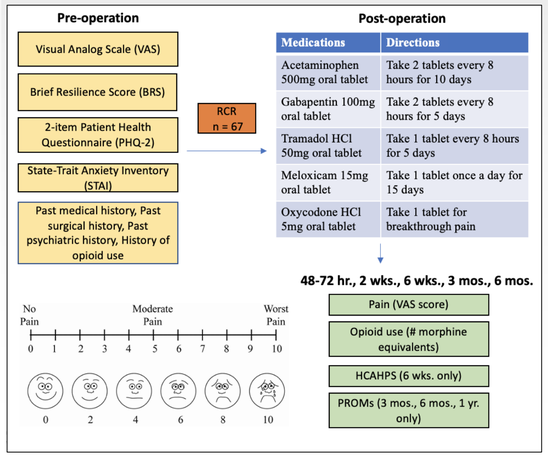
[4]Department of Orthopaedic Surgery, The Orthopedic Hospital at Long Island Jewish Valley Stream, Valley Stream, NY

INTRODUCTION

Oral narcotic agents have traditionally been the preferred analgesic following arthroscopic rotator cuff repairs (RCRs). Abuse of these substances has become a health crisis with a substantial rise in opioid overdose deaths in the past several decades.[1] Multimodal, nonopioid pain protocols have recently shown to be effective in managing pain after common arthroscopic procedures.[5] However, completely eliminating opioids may lead to decreased patient satisfaction.[5,6] Thus, it is important to identify which patients may need a small opioid prescription. The purpose of this study is to determine the effectiveness of a multimodal, nonopioid pain protocol in patients undergoing arthroscopic RCRs and predictors of rescue opioid use. Our prior preliminary data indicated that high BMI, smoking, and history of prior opioid use were predictive of rescue opioid use at 2 weeks. The current analysis is based on a completed one year prospective study of positive and negative predictors of VAS and patient-reported outcomes (PROMs) in addition to differences in these measures stratified by resilience (BRS) score and anxiety (STAI) scores.

METHODS

Preoperatively, patients undergoing primary arthroscopic RCR were administered a Visual Analog Scale (VAS) questionnaire, 2-item Patient Health Questionnaire (PHQ2), State-Trait Anxiety Inventory (STAI) 6-item short form, 6-item questionnaire assessing Brief Resiliency Score (BRS). At 48-72 hours-, 2 weeks-, 6 weeks-, 3 months-, and 6 months- post surgery, patients rated their pain (VAS). Rescue opioid use was measured until 6 weeks- post surgery. At 6 weeks, patients were additionally asked to answer two questions from the Hospital Consumer Assessment of Healthcare Provider and Systems (HCAHPS) questionnaire to assess patient satisfaction. Patients were also enrolled in Arthrex Surgical Outcomes System (SOS) registry, a web-based platform for collecting patient reported outcome measures (PROMs) at 3-and 6- months. These included the SANE, ASES, KJOC, and PROMIS-10 scores (6 months). VAS at 1 year was also obtained via Arthrex SOS.



RESULTS

Timepoint	Dependent Variable	Independent Variable	B	95% Confidence Interval for B		Significance
				Lower Bound	Upper Bound	
6 weeks	VAS	PHQ2	1.014	.118	1.910	.028
3 months	VAS	PHQ2	.998	.080	1.917	.034
1 year	VAS	Psych History	7.271	3.176	11.366	.028
3 months	ASES-function	Surgical History	-10.730	-19.355	-2.104	.019
3 months	KJOC	Psych History	-27.770	-54.913	-.626	.046
3 months	KJOC	Cuff Tear Size	21.501	6.039	36.963	.010

Table 1. Linear regression analysis

	Sex	Preop VAS 0-10	PHQ-2	2w VAS	6mo SANE	6mo ASES (Fxn)
Low to Normal Resilience Score						
Mean	-	5.9	1.0	3.6	55.5	21.0
SD	-	2.3	1.5	2.5	30.4	6.2
High Resilience Score						
Mean	-	4.4	0.1	2.1	82.1	26.0
SD	-	2.0	0.3	1.9	17.4	3.7
P-value*	0.016	0.033	0.000	0.035	0.027	0.042

Table 2. Significant differences stratified by low (STAI score 20-37) to normal resilience vs high resilience score.

	BRS	PHQ-2	Psych. Disorder	3mo ASES (Index)	Δ3mo ASES (Index)	6mo SANE	Δ6mo ASES (Fxn)	Δ6mo ASES (Index)	Δ1yr SANE	1yr PROMIS-10 (Physical)	Δ1yr PROMIS-10 (Physical)	1yr PROMIS-10 (Mental)
Low Anxiety												
Mean	4.2	0.3	-	74.5	34.9	77.3	12.8	43.5	57.0	59.7	14.6	61.0
SD	0.5	0.8	-	16.1	20.2	22.9	6.2	21.6	20.4	6.5	4.3	9.9
Moderate to High Anxiety												
Mean	3.7	1.2	-	60.3	15.8	44.7	7.1	20.5	25.4	49.3	5.2	45.4
SD	0.9	1.6	-	17.1	25.7	27.9	10.6	33.8	40.7	6.0	10.3	6.3
P-value*	0.021	0.004	0.024	0.042	0.022	0.024	0.022	0.029	0.024	0.019	0.026	0.008

Table 3. Significant differences stratified by low anxiety (STAI score 20-37) vs moderate (STAI score 38-44) to high (STAI score 45-80) anxiety.

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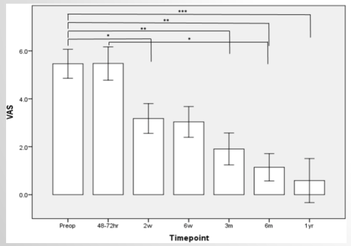

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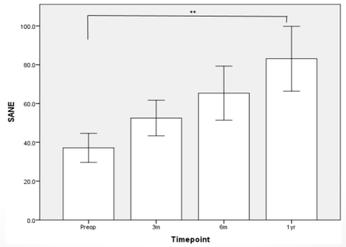

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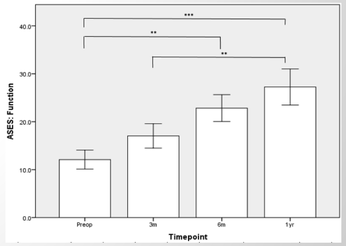

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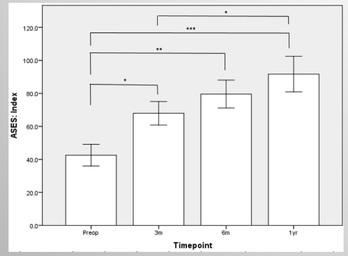

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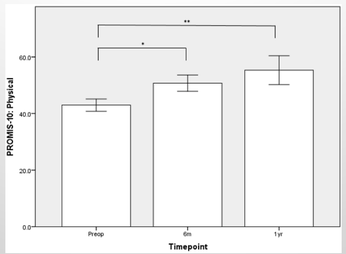

Figure 1a-e. ANOVA analysis

RESULTS

Data was obtained prospectively from a total of 67 patients. PHQ2 at 6 weeks and 3 months were positive predictors of VAS (Table 1). Psychiatric history was a positive predictor of VAS at 1 year and a negative predictor of KJOC at 3 months. Surgical history was a negative predictor of ASES-function at 3 months. Cuff tear size was a positive predictor of KJOC at 3 months. VAS preoperatively was significantly higher than VAS at 2 weeks, 3 months, 6 months, and 1 year (Figure 1). VAS at 48-72 hours was significantly higher than at 6 months. Preoperative SANE score was significantly lower than at 1 year (Figure 2). ASES Function score preoperatively was significantly lower at 6 months and 1 year (Figure 3). ASES Function score at 3 months was significantly lower than at 1 year (p=0.002). ASES Index was preoperatively significantly lower than at 3 months, 6 months, and 1 year (Figure 4). ASES Index at 3 months was significantly lower than at 1 year. PROMIS-10 Physical preoperatively was significantly lower than at 6 months and 1 year (Figure 5). There were no significant differences in patient satisfaction (HCAHPS) between patents who were adherent to the multimodal non-opioid pain protocol compared to those who were not.

The data was also stratified based on preoperative BRS and STAI scores. Between low-normal resilience score and high resilience score cohorts, pre-op VAS, PHQ2, 2 week VAS, 6 mos. SANE, and 6 mos. ASES Function scores were significantly different (Table 3). Between low anxiety and moderate-high anxiety STAI score cohorts, history of a psychiatric disorder, BRS, PHQ-2 were significantly different (Table 2). 3 mos. ASES Index, 3 mos. change in ASES Index, 6 mos. SANE, 6 mos. change in ASES Function, 6 mos. change in ASES Index, 1 year change in SANE score, 1 year PROMIS-10 physical, 1 year change in PROMIS-10 physical, and 1 year PROMIS-10 mental also differed between low anxiety and moderate to high anxiety groups. There were no significant differences in adherence to the non-opioid pain regimen or rescue opioid use when the data was stratified by BRS or STAI scores.

CONCLUSIONS

These results demonstrate the achievability and efficacy of a multimodal, non-opioid postoperative pain protocol with limited rescue narcotic use following arthroscopic RCR at our institution. Our completed prospective analysis revealed that patients reported decreasing VAS scores and increasing PROMs up to 1 year post-surgery. We also identified various positive and negative predictors for VAS and PROMs at specific timepoints. While BRS and STAI scores were not found to differ in rescue opioid use or regimen adherence, stratifying patients based on these scores revealed significant differences in VAS and PROMs. Overall, our study found 1) improved VAS and PROMs using a non-opioid pain regimen up to 1 year post arthroscopic RCR and 2) predictors of worse VAS, PROMs, and increased rescue opioid use that can help us to optimally tailor management for specific patients while limiting opioid prescriptions and therefore limiting the potential for opioid abuse.

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