Audio Distraction for Traction Pin Placement: A Prospective Randomized Controlled Study

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INTRODUCTION:

Traction pin placement followed by skeletal traction can help improve alignment and pain for femoral or acetabular fractures. This procedure can be notably painful, uncomfortable, and anxiety-provoking for patients. Studies in other fields have demonstrated improvements in patient-reported experience while undergoing uncomfortable procedures, such as colonoscopies, in the setting of various distraction methods. The purpose of this study was to assess whether providing patients with the option to listen to music from an MP3 player during femoral traction pin placement (i.e. audio distraction) helps improve patient-reported experience, pain, and/or anxiety throughout the procedure. We also sought to determine whether audio distraction influenced provider-perceived patient cooperation and difficulty of procedure.

METHODS:

This was a prospective randomized controlled study conducted at two level 1 trauma centers. Patients aged 18 or older that were conscious and oriented and with a medical need for lower extremity skeletal traction were included. Patients with a medical contraindication to skeletal traction; requiring endotracheal intubation; unable to participate in verbal communication through procedure; with sensory impairment to pain; or unable to answer surveys due to cognitive, motor, or visual deficiencies were excluded. Patients were randomized 1:1 into 2 groups: audio distraction versus no distraction. Power analysis at a type I error rate of 0.05 and 80% power identified a minimum sample size of 42 (21 each group) required to detect a clinically significant effect. Pin placement was conducted by the orthopaedic surgery resident on call. Patients in the audio distraction group were given an iPod and headphones and instructed to start playing music immediately before administration of local anesthesia. All patients received local lidocaine anesthesia (10cc at pin entry point and 10cc at exit point) followed by Steinmann pin placement in either the distal femur or proximal tibia. Skeletal traction was applied in standard fashion by connecting the pin to a traction apparatus and hanging a weight on the opposite side. After the procedure, patients were given surveys and asked to rate (1) overall experience, (2) anxiety, and (3) pain using 1-10 Likert scales (1 being worst possible outcome, 10 being best possible outcome). Similarly, surveys with 1-10 Likert scales for (4) patient cooperation and (5) difficulty of procedure were completed by residents. Demographic, injury, and treatment characteristics were extracted for each patient through retrospective chart review. Categorical and continuous variables were compared between groups using two-sample student t-tests and chi-square tests, respectively. Mann Whitney U tests were conducted to compare outcomes between groups.

RESULTS:

Thus far, 42 patients (21 audio distraction vs 21 no distraction) have been enrolled. The group was mostly male (59.5%) and had an average age of 52.9. There were a total of 26 femoral fractures, 14 acetabular fractures, and 6 pelvic ring fractures. Baseline characteristics were similar between the study arms. Although there were no significant differences between the groups regarding overall experience (p=0.818) or pain (p=0.254), the audio distraction group reported significantly less anxiety compared to the no distraction group (4.9 vs 7.0, p=0.036). There were no differences between the groups regarding provider-perceived patient cooperation (p=0.303) or procedure difficulty (p=0.704).

DISCUSSION AND CONCLUSION:

Providing audio distraction for orthopaedic trauma patients undergoing lower extremity traction pin placement led to significantly less anxiety during the procedure and did not affect provider-perceived difficulty or patient cooperation. Considering the associated relative low risk and low cost of this intervention, audio distraction could potentially be effectively implemented as a way to reduce patient anxiety during lower extremity traction pin placement in level 1 trauma centers.

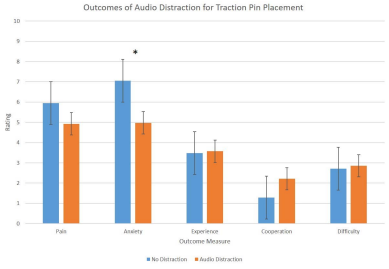

Table 1. Baseline characteristics for audio distraction vs no distraction groups (N=42).

Variable	No Distraction (n=21)	Audio Distraction (n=21)	p-value
Age	51.9 ± 20.5	53.9 ± 21.2	0.770[1]
Sex			0.346[2]
Male	14 (66.7%)	11 (52.4%)	
Female	7 (33.3%)	10 (47.6%)	
BMI*	29.1 ± 12.7	28.1 ± 5.6	0.747[1]
Smoking History	10 (47.6%)	15 (65.2%)	0.116[2]
Substance Abuse History	4 (19.0%)	6 (28.6%)	0.469[2]
Mental Health Diagnosis	6 (28.6%)	7 (33.3%)	0.739[2]
Open Fracture	2 (9.5%)	1 (4.8%)	0.549[2]
Polytrauma	9 (42.9%)	12 (57.1%)	0.355[2]
Fracture Location (N=46)			0.415[2]
Femur	11 (47.8%)	15 (65.2%)	
Acetabulum	9 (39.1%)	5 (21.7%)	
Pelvic Ring	3 (13.1%)	3 (13.1%)	
Pin Location			>0.999[2]
Distal Femur	10 (47.6%)	10 (47.6%)	
Proximal Tibia	11 (52.4%)	11 (52.4%)	
Prior Prescription			
Opioids	2 (9.5%)	1 (4.8%)	>0.999[3]
Anxiolytics	0 (0.0%)	2 (9.5%)	0.489[3]
Muscle Relaxants	2 (9.5%)	1 (4.8%)	>0.999[3]
Surgical Treatment	21 (100%)	21 (100%)	>0.999[3]

Categorical data is reported as N(%). Continuous data is reported in mean ± S.D.
[1]Results of two-sample student t-test (significance set at p=0.05).
[2]Results of chi-square test (significance set at p=0.05).
[3]Results of Fisher exact test (significance set at p=0.05).
*BMI = Body Mass Index

Table 2. AO/OTA[a] Fracture Classification for All Included Study Fractures (N=46).

Fracture Location/Type[c]	No Distraction (n=23)	Audio Distraction (n=23)	p-value[d]
Femur	11 (47.8%)	15 (65.2%)	0.234
31A	2	2	
32A	6	9	
32B	1	3	
32C	2	0	
Acetabulum	9 (39.1%)	5 (21.7%)	0.200
62A	3	2	
62C	5	3	
Pelvic Ring	3 (13.1%)	3 (13.1%)	>0.999
61A	1	0	
61B	0	1	
61C	1	2	

Data presented in N(%) format.
[a]AO/OTA classification was censored for fractures that did not have accompanying imaging available for interpretation.
[d]All results of chi-square test (significance set to p=0.05).
[c]AO/OTA = Association of Osteosynthesis/Orthopaedic Trauma Association