The Role of Perioperative Fluid Resuscitation on Same Day Total Joint Arthroplasty Discharges at a Level 1 Academic Center

Brandon Evan Lung MD[1], Leo Issagholian BS[1], Megan Donnelly MD[1], Amanda Tedesco BS[1], Ryan DiGiovanni MD[1], William C. McMaster MD[1], Russell N. Stitzlein MD[1], Steven Yang MD[1]
University of California Irvine Department of Orthopaedic Surgery, Orange, CA, USA[1]
Blung@uci.edu

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INTRODUCTION: Although fluid therapy remains an essential aspect of surgical optimization, the role of optimal perioperative fluid management in patients undergoing elective total joint arthroplasty (TJA) is not yet established. With the increase in frequency of TJA in the growing elderly population, it is important to medically optimize and resuscitate patients during surgery to reduce complications, decrease length of stay (LOS), and improve outcomes. As healthcare economics shifts to outcomes based bundled payment models with the trend towards same day arthroplasty discharges (SDS), providers must understand the evolving dynamics of fluid resuscitation prior to elective surgery. Elderly patients are often dehydrated and are at an inherently high risk of having an extended LOS and prolonged recovery from surgery due to comorbidities and sensitivity to anesthesia. While overly aggressive intraoperative fluid management may lead to volume overload and postoperative bowel mobility issues, a restrictive fluid regimen increases the risk for postoperative hypotension, orthostatic imbalance, and acute kidney injury. The purpose of this retrospective review was to investigate the effects of perioperative fluid management on same day discharge rates, physical therapy performance, and surgical complications.

METHODS: A retrospective review of 158 primary TJA patients, consisting of 77 total knee and 81 total hip arthroplasty patients, from 2021-2023 preoperatively planned for same day discharge was conducted at an academic medical center. Age, gender, BMI, ASA class, type of anesthesia administration, and medical comorbidities were compared to assess preoperative cohort characteristics. Preoperative hemoglobin, modified index 5 Frailty scores, and preoperative dehydration status were assessed to account for confounding variables. Intraoperative fluid and total perioperative fluids given on date of surgery were compared between patients who were discharged on date of surgery versus patients who did not clear discharge criteria, including postoperative pain, nausea/vomiting, orthostatic hypotension, and failure to clear minimum safe physical therapy requirements. Mobility scores and safe discharge were assessed by a physical therapist and visual analog scale (VAS) pain scores and systolic blood pressure measurement averages were recorded by the perioperative nurses. Readmission, reoperation, periprosthetic joint infection, and wound complication rates were assessed at 30 and 90-day postoperative visits.

RESULTS SECTION: Of the 158 TJA patients planned for SDS, 13% of patients were discharged home on postoperative day 0 (POD), including 10% of TKA and 21% of THA patients. Between SDS and non-SDS groups, there were no significant differences in preoperative demographics, including mean age 63 ± 8.1, BMI 30 ± 3.5, gender, modified index 5 frailty index scores, preoperative hemoglobin 13.4 ± 1.2, ASA class, anesthesia type, and preoperative dehydration status as assessed by BUN/Cr. Patients receiving mean intraoperative fluids of at least 1200cc ±300cc had a statistically significantly higher rate of SDS compared to patients receiving mean 900cc ± 320cc fluids. Patients who were discharged on day of surgery had an overall lower total urine output 419.6 ± 400 cc vs 850.5 ± 350cc in patients requiring overnight hospital monitoring. SDS patients were found to have a significantly higher Total Fluids/BMI ratio compared to non-SDS patients (60.0± 16 vs 50.8 ±20.4). Patients who were found to have orthostatic hypotension during physical therapy sessions had a significantly lower Total Fluid/BMI ratio compared to normotensive patients. Surgical estimated blood loss and total fluids given on date of surgery, including postoperative oral hydration in the recovery unit, were not statistically significant between discharge groups. There were no significant differences in postoperative readmissions, medical complications, or perioperative joint infection rates between discharge groups.

DISCUSSION: Intraoperative fluid resuscitation is an essential component of safe same day discharge in TJA patients. The Total Fluids/BMI ratio may be a useful tool to help guide appropriate intraoperative fluid administration based on varying BMI ranges. While the cumulative total fluids administered was not found to be an independent risk factor, our study suggests intraoperative administration during surgical intervention may be more beneficial in postoperative recovery compared to relying on oral replenishment in the recovery unit. Intraoperative fluid optimization of TJA patients may decrease instances of orthostatic hypotension, tachycardia, dizziness, and fatigue that may preclude patients from working with physical therapy and return to safe mobility.

SIGNIFICANCE/CLINICAL RELEVANCE: Optimization of intraoperative fluid resuscitation in TJA patients is an important component of postoperative recovery and likelihood of successful same day discharge.