Acta Orthopaedica 2018; 89 (2): 141–144

Outpatient total hip and knee arthroplasty

Facts and challenges

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Submitted 2017-08-10. Accepted 2017-10-03.

ABSTRACT— As a result of the introduction of fast-track programs, the length of hospital stay after arthroplasty has decreased to a point where some patients meet the discharge criteria on the day of surgery. In several studies, well-established fast-track centers have demonstrated the feasibility of outpatient procedures in selected patients. However, in literature the term "outpatient" is sometimes also used for patients who spend one or more nights in hospital. We therefore propose to use "outpatient" solely for patients who are discharged to their own home on the day of surgery and do not have an overnight stay at either the hospital or another non-home facility. Also, several challenges need to be overcome before this becomes an established procedure. The combination of preoperative high-dose steroids and multimodal opioid-sparing analgesia has enhanced patient recovery after arthroplasty, but efforts to control undesirable pathophysiological responses will be a prerequisite to improve the success rate of an outpatient setting. Also, care must be taken to avoid extra activities or investments solely to enable discharge on the day of surgery. Further cost analyses will have to be performed to establish the true financial benefit of outpatient treatment.

In the past decades, fast-track programs have successfully been introduced in orthopedics, mainly in total hip and knee arthroplasty (THA and TKA). Thus, a combination of organizational and medical improvements in the pain and anesthetic, mobilization, and surgical protocols has led to enhanced recovery of patients after arthroplasty lowering morbidity and mortality.

As a side effect of these programs, length of hospital stay (LOS) decreased to a point where a majority of total joint arthroplasty (TJA) patients reached the essentially unchanged discharge criteria after the first postoperative night (Klapwijk et al. 2017). Although some patients reach these criteria on the day of surgery, outpatient TJA remains a psychological barrier in many institutions; in addition, reimbursement issues and concerns over safety prevent surgeons from allowing patients to go home on the day of surgery (Thienpont et al. 2015). Until recently, the reports of outpatient TJA have mostly been anecdotal, single surgeon or single institution based on selected patient populations (Berger et al. 2005, Dorr et al. 2010, Aynardi et al. 2014, Hartog et al. 2015, Kort et al. 2015). However, 2 more recent papers report on a multicenter randomized trial (Goyal et al. 2017) and a 2-center study with unselected patients (Gromov et al. 2017), confirming the feasibility of outpatient TJA in unselected populations. However, many challenges need to be overcome before it can be defined as an established treatment option and with more widespread recommendations.

Definition of outpatient THA and TKA

Different definitions of outpatient arthroplasty are used in publications. In some reports a length of stay of < 23 hours is defined as outpatient (Sher et al. 2017), whereas others define outpatient as hospital discharge on the day of surgery (Nelson et al. 2017). The National Surgical Quality Improvement Program (NSQIP) used in many studies appears not to be a consistent entity. In a study by Bovonratwet et al. (2017) using the NSQIP, of the 529 THA patients who were registered as outpatients, only 63 (12%) were actually discharged on the

DOI 10.1080/17453674.2017.1410958

day of surgery and of 890 patients undergoing TKA who were registered as outpatients, only 95 (11%) were discharged on the day of surgery. Current regulations in the United States allow for these observed patients to stay more than 1 night in hospital under observation status, despite being coded as outpatients (Bovonratwet et al. 2017). Some studies that report on outpatient TJA with data from the NSQIP use the outpatient variable, which may include patients who have been admitted for 1 night or more (Lovecchio et al. 2016, Courtney et al. 2017), whilst others use the LOS variable, including only patients with an LOS of 0 nights (Sher et al. 2017, Nelson et al. 2017). Clarity and uniformity is essential in publications on outpatient TJA. We would therefore propose to reserve the term "outpatient" solely for patients who are discharged to their own home on the day of surgery and who do not have an overnight stay at either the hospital or another non-home facility.

Why in hospital: pathophysiological considerations on postoperative recovery

When discussing the possibilities for outpatient TJA, the basic question is what the reasons are for "staying in the hospital." There seem to be 3 types of reasons: early organ dysfunction, appearance of complications, and organizational factors (Husted et al. 2011). Among the early organ dysfunctions, pain, nausea and vomiting, fatigue, weakness, and dizziness are the main complaints. In contrast, a well-implemented fast-track approach has been demonstrated to decrease the risk of thromboembolic complications, cardiopulmonary complications and mortality, delirium, etc. Furthermore, a fast-track approach will attenuate the consequences of the otherwise well-established comorbidities (diabetes, cardiopulmonary, etc.) as risk factors for hospitalization and complications (Jørgensen et al. 2016).

Since a study of unselected patients planned for TJA (Gromov et al. 2017) has shown that about 15–20% can be managed in an outpatient setting, the main question to be answered is: What are the reasons for delayed recovery and discharge in the remaining 85%? Obviously, organizational issues may account for a proportion of patients in which discharge is delayed. However, as mentioned earlier, the early organ dysfunctions leading to a risk of delayed recovery and/or complications, which are principally mediated by the surgical stress responses (neuroendocrine/inflammatory/immunological), may be the most important determinant for delayed recovery in TJA (Gaudilliere et al. 2014). Consequently, the possibilities for future enhancement of a successful and safe outpatient TJA setting will require interventions to attenuate these responses. For this purpose, preoperative high-dose steroids (Jørgensen et al. 2017) in combination with well-established multimodal opioid-sparing analgesia are most promising. Despite these improvements, the future challenges will include more attention to specific high-risk patient groups such as those receiving preoperative opioids, pain catastrophizers, and patients receiving psychopharmacological treatment (Greene et al. 2016, Jørgensen et al. 2016). Also, the mechanism for the pronounced early loss of quadriceps strength in TKA (which may lead to weakness and risk of falling) needs to be clarified. Neither surgery without the use of a tourniquet nor high-dose steroids have so far solved this problem (Lindberg-Larsen et al. 2017). Finally, the well-documented patient complaints concerning nausea, dizziness, and risk of syncope and falling may be related to early orthostatic intolerance (Jans and Kehlet 2017). Further research is required to define the relative role of autonomic nervous system disturbances, opioid use, and the inflammatory response. The risk of delirium has essentially been eliminated by the fast-track setup (Petersen et al. 2017), but further challenges and need for improvement are related to the pronounced early sleep disturbances that also may have an influence on subsequent pain responses (Chouchou et al. 2014). Finally, the risk of severe complications must be differentiated between "medical" and direct "surgical" complications, since the fast-track approach primarily focuses on improvements in medical morbidity in contrast to an initial "surgical" complication (hip dislocation, bleeding, etc.), which may be related to surgical expertise (Kehlet and Jørgensen 2016). However, the overall risk of mortality with the fast-track approach is currently extremely low (Jørgensen and Kehlet 2017) and not considered to be a relevant safety issue within a potential outpatient setting. In summary, efforts to control undesirable pathophysiological responses to TJA will be a prerequisite to improve the success rate of an outpatient setting. The main challenge remains to demonstrate the safety and positive patient recovery aspects of an outpatient setting vs. staying until the next day or even a little longer in the identified specific high-risk patient groups already mentioned.

Economic benefits of outpatient TJA

In an economically challenged environment like today's hospital system, the financial burden of an increasing number of arthroplasties needs to be addressed. Thus, it has been estimated that the number of hip and knee arthroplasties will increase by 75% in the years to come in the US alone (Kurtz et al. 2014) and similar projections have been made for Sweden (Nemes et al. 2014).

Fast track has, apart from being clinically superior to more conventional pathways and resulting in less morbidity and mortality, also been shown to be financially attractive by lowering LOS. Thus, very low costs of around US$ 2,500 for a 2-day stay have been calculated in 2 Danish fast-track departments using the Time Driven Activity Based Costing method (Andreasen et al. 2017). The economic benefit of outpatient TJA is the lower cost associated with the reduced length of

stay (Aynardi et al. 2014, Lovald et al. 2014). Also, outpatient TJA can be performed in selected healthier patients in Ambulatory Surgical Centers (ASC), which may benefit from reduced overhead costs compared with inpatient hospitals (Parcells et al. 2016, Klein et al. 2017). However, in inpatient hospitals, the reduced cost associated with outpatient treatment is more difficult to assess. After all, a bed that would normally be used for a TJA patient will not always be filled with another patient on the orthopedic ward on that same night. In contrast, operating on the outpatient ward/ASC in hospitals that do not have any patients or hospital staff in the evening or at night would lead to cost reduction.

Attention must, however, also be given to the costs that are incurred outside the ASC or the hospital. If, as a consequence of discharge on the day of surgery, patients are transferred to skilled nursing facilities instead of their own home, if extra physical therapy is indicated or if extra home care or home visits by nurses or physical therapists are needed, the potential financial benefits for ASCs or hospitals are outweighed by the additional activities in the postoperative period. Also, if discharge on the day of surgery leads to more readmissions or complications the potential financial benefits are nullified or worse. Therefore, further cost analyses will have to be performed to establish the true financial benefit of outpatient treatment. Consequently, the primary goal of physicians who implement an outpatient program should be to ensure patient safety and avoid extra activities or investments that are employed solely to enable discharge on the day of surgery unless a cost–benefit analysis is performed beforehand. Altogether, although healthcare budgets are under pressure, cost reduction or profit optimization should not be the main driver of outpatient treatment.

Conclusions

The published studies on outpatient TJA from Europe have all been from institutions that have a well-established fast-track protocol (Hartog et al. 2015, Kort et al. 2015, Gromov et al. 2017, Hoorntje et al. 2017). As a result of their programs, these hospitals have seen their length of stay gradually decrease to a point where outpatient TJA seemed feasible. This requires, however, a serious investment in time and resources and without this effort other hospitals should not commence an outpatient program. For most hospitals, outpatient TJA surgery should not be a goal in itself, but should rather be the result of a successful, already implemented fast-track program based on the concept "first better – then faster." Only then will it not lead to an increased rate of complications and readmissions. Consequently, several challenges lie ahead focusing on organizational aspects, improving interventions to reduce the risk of organ dysfunction, safety issues, and economic consequences.

HK, HH and SV planned the paper. SV drafted the manuscript. All authors revised and approved the final manuscript.

SBWV has a consultant contract with Zimmer Biomet (ZB). HH and HK are adivisory board members in Rapid Recovery ZB. ZB had no involvement in this study. The authors declare no conflicts of interest.

Acta thanks David Houlihan-Burne and Steen Sameer Khan for help with peer review of this study.

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