

## Chapter 18

# Total Hip in a Day: Setup and Early Experiences in Outpatient Hip Surgery

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## 18.1 New Hip in a Day: Setup and Initial Clinical Experiences in Germany

### 18.1.1 Introduction

Total joint replacement of the hip is one of the most frequently performed surgeries in the orthopaedics, with approximately 230,000 primary operations in 2010 in Germany [1] and more than 310,000 in the United States [1, 2]. In our clinic, the authors operate on approximately 300 patients with elective total hip arthroplasty (THA) per year. In the recent years, we have adapted the rapid recovery track for our total joint replacement patients [3, 4]. This

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means that patients who receive a knee or hip replacement will be discharged after a maximum of three to four days of the surgery.

In this chapter, we will present our initial experiences with the first 10 cases (five females and five males; average age 60 years) of patients that underwent ambulatory elective hip replacement surgery, so-called hip in a day. Inspired by our Dutch colleagues around Dr Stephan B. Vehmeijer at Reinier de Graaf Hospital, Delft, which was the first group in Europe to perform THA in an outpatient setting [5, 6], we have initiated an ultrafast recovery track, which is in fact an ambulatory setting of patients undergoing primary cementless THA under general anaesthesia. This selected patient group was discharged the same day as the surgery.

An ambulatory setting of patients undergoing THA is not a brand-new concept and was to the best of our knowledge first published by Dr Richard Berger and his colleagues out of Chicago, Illinois. This study group operated on 100 patients as early as in the year 2000. Of these patients 97 were discharged the same day as the surgery [7–9]. In the meantime a few other study groups have published their results and experiences with hip replacement surgery and patient discharge on the same day [10–13]. However, this is still an uncommon pathway in orthopaedic clinics and remains a challenging endeavour.

Achieving all prerequisites for a patient to be discharged on the day of surgery requires intense coordination within the entire medical team in the hospital with respect to content and communication. Suitable for this programme are active patients without any major concomitant diseases and with a stable and reliable home environment, where adequate care for these patients once they are home is ensured. All patients complete a preoperative patient training programme and receive emotional and structural preparation, both for the surgery and postoperative care. Further, a special cleansing and body care regimen is also explained and prepared, and assistive devices are provided (underarm crutches, grips and rails, raised toilet seat, etc.) if necessary. Once patients have completed the specific preop preparation and the patient training successfully, they go back home and return to the hospital early on the day of surgery.

### 18.1.2 The Course of the Day of Surgery

The schedule on the day of the surgery is as follows: The patient is admitted to the ward at approximately 6:30 a.m. The patient is accompanied by a coach (Fig. 18.1), who has been designated by the patient long before the surgery date and who has attended the patient training together with the patient. The task of the coach is to provide support as well as emotional and practical care for the patient.



**Figure 18.1** A female patient is entering the hospital early in the morning.

The patient receives a bed in the day ward (Fig. 18.2).



**Figure 18.2** The patient receives a bed in the day ward.

Routine preop prep is performed as for all patients, and the patient is brought into the operating room, where he or she is placed into the necessary position and anaesthesia is administered. Either

spinal anaesthesia or general anaesthesia may be appropriate. In our hospital, general anaesthesia is preferred and was done in the 10 cases of our hip-in-a-day patients. Ideally, the operation is scheduled as the first case of the day (incision at 8:00 a.m.) so that rehabilitation can start as soon as the patient is awake and stable, usually as early as 9:30 a.m. Standard general anaesthesia is followed by a laryngeal mask airway. No endotracheal tube or inhalation anaesthetic was used in these cases. Furthermore, we use short-acting anaesthetics with total intravenous anaesthesia (TIVA) based on propofol-remifentanyl (Ultiva) for fast-recovery eligibility. The primary objective of the general anaesthesia for our purposes is to achieve full muscular relaxation with Esmeron (rocuronium bromide) during the operation without any postop myalgia, adequate postoperative nausea and vomiting (PONV) prophylaxis with ondansetron and dexamethasone, and postoperative bleeding and pain management.

For bleeding prevention intravenous (IV) administration of 1 g tranexamic acid is administered. Additionally for pain, the patient receives 2 g of metamizole, 50 mg of dexketoprofen and 3 or 4 mg piritramide all intravenously. We also routinely administer a single shot of antibiotics (cefuroxime 1.5 g) intravenously (Table 18.1).

Our technique for THA is a minimally invasive single-incision anterior approach (Fig. 18.3).



**Figure 18.3** Intraop single-incision anterior approach combined with intraoperative local infiltration anaesthesia – the so-called LIA (200 ml 0.2% Naropin [ropivacaine] solution: 150 ml with 1 mg epinephrine and 50 ml without any epinephrine for subcutaneous infiltration).

**Table 18.1** Overview of standard medication administered to the hip-in-a-day patient

Dipidolor 2 mg IV	Novalgin (metamizole)	Novalgin (metamizole)	Novalgin (metamizole)
Tranexamic acid 1 g IV	2 g IV	500 mg	500 mg 2-2-2
Cefuroxime 1.5 g IV	Sympal (dexketoprofen) 50 mg IV	Dipidolor (piritramide) 2 mg IV, as needed	Omeprazole 20 mg 1-0-0
	Dipidolor (piritramide) 4 mg IV	Arcoxia (etoricoxib) 120 mg 0-0-1-0	Arcoxia (etoricoxib) 120 mg 1-0-0-0
PONV prophylaxis:	LIA 150 ml Naropin (ropivacaine)	Targin (oxycodon) 10 mg at home	Targin (oxycodon) 10 mg only in the evening and as needed
Dexamethasone 4 mg IV	+ 1 mg		
Ondansetron 4 mg IV	epinephrine 50 ml Naropin		
Saline solution 1500 ml IV	without epinephrine s.c. Esmeron (rocuronium)		

The use of local infiltration anaesthesia (LIA) is well documented in the literature [19–21] and results in early full-weight-bearing functional and pain-free mobilisation. The patients are allowed their first liquids and energy supply in the form of a sweet ice cream as early as 30 minutes postop. If this is tolerated well, which usually depends exclusively on the medication administered, the first mobilisation can follow immediately. Approximately 45 minutes after extubating, the patient can stand up and walk two to three steps with help from another person, such as a nurse or a physician (Fig. 18.4).

In the recovery unit we frequently do IV administration of 2 mg of piritramide up to three times that day, as well as 500 mg metamizole oral in the late afternoon. Immediately following the patient's return out of the operating room, the second mobilisation is conducted about 90 minutes postop by a physical therapist, followed by two further mobilisations with an increasing radius of motion, walking down the room or hallway (Fig. 18.5).



**Figure 18.4** Patient stands up first time after surgery with the help of the surgeon.



**Figure 18.5** Patient walks down the hallway of the ward with the help of a physical therapist.

A standard lunch is served about three hours postop. In general, energy supply plays a major role overall in the outpatient postop rehabilitation. Also very important are periods of rest, during which the patient relaxes or naps. Approximately five hours postop, stair climbing with an underarm crutch is practiced – the first time with help, the second time independently. The underlying principle for the outpatient setup is,

‘Eat, sleep and train’. Supper is served in the early evening, and the wound is checked through the transparent sterile bandaging to make sure it is dry. A Redon drainage is routinely omitted. If everything is tolerated well, the patient can be discharged by the surgeon and the physical therapist jointly. Obviously, it is important

to prescribe adequate postoperative pain medication that prevents dizziness, faintness or nausea and vomiting. In addition to a small dose, for example, 3 mg Dipidolor (piritramide), at about 9:00 a.m., a nonsteroidal anti-inflammatory drug (NSAID) is given in the hospital and Targin (oxycodon) 10/5 is prescribed for use at home at 9:00 p.m. The outpatient follow-up check-ups as well as follow-up physical therapy are arranged prior to the surgery date.

### 18.1.3 Discussion

An endoprosthetic hip replacement represents one of the most beneficial, gratifying and successful surgical procedures in the field of orthopaedics. In recent years, there has also been a significant reduction in overall surgical trauma as well as a considerable reduction of the average time spent in the hospital, due to improvements in surgical techniques, advanced implants and improved management of the patient, including anaesthesiological management [14]. The average time spent in the hospital after THA can be quite varied within the overall European culture, with averages in Germany being relatively high when compared to other Western countries [15].

While years of advocacy for fast-track surgery have resulted in reducing the average hospital stay of hip replacement patients to approximately 2–3 postop days in the Scandinavian countries [3], in the United States on average 3 nights [1, 2] and within the territory of the Federal Republic of Germany, hospitalisation of almost 8–12 days are very common [15]. In our orthopaedic surgery department at the GPR Rüsselsheim Hospital, Germany, we have been able to reduce the length of stay for THA to approximately three to five postop days for several years now, including more than 100 individual cases of only one to two days, by relying on the clinical studies of our Scandinavian and Dutch colleagues [3–6]. By changing and optimising the anaesthesiological setup, using minimally invasive surgical techniques, improving postoperative pain therapy and optimising physical therapy, we have now been able to perform single-day outpatient hip replacement procedures in selected patients for about one year. This means that these patients stay in the hospital only for the day of surgery and leave on the same evening. So far, there have been no readmissions, complications

due to too early discharge or any other adverse events related to shortened length of stay. All patients that were initially identified for the ambulatory pathway did in fact leave the same day. There were no clinical reasons for prolonged length of stay. During the follow-up course all 10 patients stated that they were very satisfied with the ambulatory concept and that they would recommend it to a friend or family member.

Only healthy patients who have a good family caregiver environment at home are suitable for same-day hip replacements. Unsuitable for these same-day procedures are patients with concomitant conditions such as cardiovascular diseases, diabetes mellitus and neurologic impairments. Patients with a health status of ASA-III (an American Society of Anesthesiologists classification) or greater or patients with inadequate care available at home, for example, patients without a partner or a caregiver, are also not suitable.

Performing a hip replacement in a single-day requires vigorous efforts, which includes the commitment of the patient, the patient's social circle and the entire clinical organisation, which must be available to the patient during that entire day and even through the night via telephone. To optimise the preoperative preparations, we implemented the 'Rapid-Recovery-School' for our patients (Table 18.2).

**Table 18.2** Numerus professionals teaching in a predetermined sequence at the Rapid-Recovery-School in our hospital. Each course is 10 minutes

Sequence	Professional
1st	Orthopaedic surgeon
2nd	Anaesthesiologist
3rd	Physical therapist
4th	Station desk personnel
5th	Physician assistant or nurse
6th	Medical supply store representative
7th	Social service worker

This includes a patient-teaching-and-training course one week prior to surgery. In this patient training, each of the professional

groups the patient will encounter during the single-day surgery holds a 10-minute presentation (Fig. 18.6).



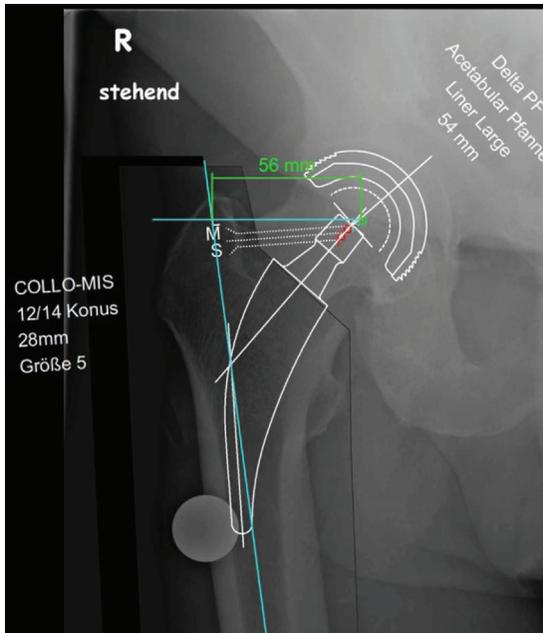
**Figure 18.6** Dr Thilo Hartmann, anaesthesiologist, is giving a 10-minute lecture in the Hip-in-a-Day school.

This helps, the patient to prepare for the operation physically, for example, hygiene; practically as well as emotionally. Everyone, from the surgeon to the anaesthesiologist to the hospital's social services representative, presents the important topics that will prepare the patient and make a worry-free recovery of the patient at home possible.

Patient training includes a multidisciplinary approach consisting of the following professionals in a predetermined sequence: (i) the orthopaedic surgeon, (ii) the anaesthesiologist, (iii) physical therapist, (iv) station desk personnel, (v) physician assistant or nurse, (vi) medical supplies store representative and (vii) the social service worker (Table 18.2).

Otherwise, preop preparation is the same as for patients who will remain in the hospital for a few days. This includes routine anaesthesiological evaluation and preop diagnostic laboratory work and X-ray tests, including the digital planning of the endoprosthetic hip implant (Fig. 18.7).

In addition to the standard medications, we routinely administer 120 mg Arcoxia (etoricoxib) at 7:00 p.m. and Targin 10/5 at home at about 9:00 p.m. once the patient gets home. Management of antithrombotic therapy consists of Clexane (enoxaparin) injections or Xarelto (rivaroxaban) for 30 days after surgery.



**Figure 18.7** Preop X-ray digital planning of a neck-preserving short stem for the right hip.

The surgical procedure for hip replacement is performed via an anterior single-incision approach as the current standard procedure in our hospital [16] (Fig. 18.3).

This means that the hip joint is approached from the intermuscular spaces between the *M. tensor fasciae latae* muscle and the sartorius or rectus muscle. No muscles, tendons or ligaments are dissected! After clamping or ligating the femoral circumflex artery, the hip joint can be exposed from the front with very little bleeding. Following preparation of the acetabulum, the hip joint replacement is performed. On the basis of the corresponding preoperative planning and trial positioning, the final hip endoprosthesis is implanted and its position checked (Fig. 18.8).

Both short-stem implants as well as traditional cemented or uncemented shafts can be implanted via the anterior approach. During the surgery, we administer systemic IV infusion of 1 g tranexamic acid, which reduces blood loss. We administer exclusively via IV infusion, not via topical injections of tranexamic acid since

it was shown to be more effective than topical injections [17, 18]. We also routinely infiltrate a total of 200 ml 0.2% Naropin solution into the treatment area as intramuscular infiltration as a standard procedure, of which 50 ml, injected subcutaneously, does not contain epinephrine and another 150 ml contains 1 mg epinephrine for topical pain therapy and to reduce bleeding. There are several papers showing the positive results of this pain management [19–21]. We also experienced that our patients benefit from the LIA and tranexamic acid administration, as we can relinquish the use of a Redon drainage. This allows the patient to be mobilised immediately after surgery, which is one of the key factors for early discharge.



**Figure 18.8** X-ray showing a neck-preserving short stem in an optimal position in the femur and cup in the acetabulum.

After this, the operation is completed by closing up the layers of the wound – tensor fascia latae suture, subcutaneous suture and closure of the skin via intracutaneous suture or staples – with additional use of skin adhesive (Dermabond). This serves to further seal the wound and reduces postoperative secretion significantly. Finally, the surgical area is covered by sterile transparent dressing, which shall remain on the skin ideally for 12 days.

In a recent presentation at the American Academy of Orthopaedic Surgeons (AAOS) meeting in San Diego Dr Taunton from the Mayo

Clinic in Rochester, Minnesota, reported about the short-term benefit of anterior hip replacement. With the anterior procedure, less morphine was needed, ratings of pain were lower and the distance walked during the first walking session with a physical therapist was farther than with the posterior procedure. Radiographic parameters and complications were comparable between the two groups [22]. The authors have previously evaluated the very good clinical outcome of minimally invasive THA using a neck-preserving short stem in 270 patients with either an anterolateral or with an anterior tissue-sparing approach to the hip [16, 23].

Certainly, the anterior approach is challenging and needs a learning curve but was proven to have clinical advantages [22, 24]. Minimally invasive surgery (MIS) techniques for THA have the potential for reduced tissue trauma, leading to a more rapid recovery and return to function, compared with traditional approaches to THA. However, to achieve these potential benefits, all other aspects of patient care need to be modernised. Development and implementation of these newer anaesthetic and rehabilitation protocols allow MIS-THA to be done safely. In their study, Dr Sher et al. identified characteristics associated with same-day discharge after THA as well as assessed risk factors for complications in this select patient population. They came to the conclusion that patient characteristics, comorbidities and severe adverse events before discharge can be used to assess the potential for discharge within 24 hours [10].

Klein et al. evaluated the safety of 549 outpatient THAs that were operated in an ambulatory surgical centre. The average age of the patients was 54.4 years (range 27–73). The average ASA score was 1.6 (range 1–3). Of the 549 patients, 3 (0.5%) were admitted from the surgery centre to the local hospital due to adverse events. The authors came to the conclusion that same-day discharge THA at an ambulatory surgical centre is safe, reproducible and effective when performed on the appropriately indicated patient [13].

What makes it in fact possible to discharge the patient the same day as the surgery? It is a combination of anaesthesia and immediate postop rehab protocols combined with optimal pain management advancements in multimodal opioid-sparing analgesia [25, 26],

minimal invasive surgical techniques (e.g., approach to the joint), no dissection of muscles and tendons and certainly the selection of the implant, which has to be suitable for implantation via the intermuscular gaps. Furthermore, no standard urine catheters are used and no opioid medications are administered while the patient is still in the hospital. Subsequently, it is critical to carefully select the patient, who should be an active and motivated individual and also has a stable and caring family and friend environment. The final discharge criteria are that patient has no orthostatic hypotension, is able to walk down the hallway at least 150 m with or without an assistive device and is able to walk up and down the stairs without any major problems.

When all these points are coming together and no immediate postoperative adverse events occur, we are very confident to let the patient go home the same day as the surgery (Figs. 18.9–18.11).



**Figure 18.9** The patient is leaving the ward in the early hours of the evening.



**Figure 18.10** The patient is leaving the hospital around 7 p.m.



**Figure 18.11** The patient has arrived home the same day as the hip replacement surgery.

Due to the increased pressure of work and inadequacy of time, this ambulatory setting for hip replacement is used and its initial report is herewith presented.

This concept will certainly undergo many modifications and changes over time. However, in our preliminary experience and on the basis of the work of some other orthopaedic institutions around the world [13–22], outpatient total hip replacement is feasible and well tolerated by a selected group of patients. Nevertheless, further scientific work is required to optimise standard protocols for rapid recovery and outpatient settings in THA. There is a need for high-quality prospective cohort and randomised trials to definitively assess the safety and effectiveness of outpatient THA [12]. Our research group will conduct a large German-government-funded multicentre research study ‘PROMIS’, in order to give valid answers to at least some of these unknowns. We are very confident that in future years fast-track and outpatient THA will be a standard and routine surgery for a selected group of patients.

## **Appendix: Our Standardised Protocol for Pain Management**

Preoperative:

- Dipidolor 2 mg IV and more as needed
- Tranexamic acid 1 g IV

- Cefuroxime antibiotic 1.5 g IV
- 1500 ml isotonic saline solution

#### Perioperative

- LIA 200 ml (150 ml with epinephrine, 50 ml without epinephrine)
- Novalgin 2 g IV
- Sympal 50 mg IV
- Dipidolor 3–4 mg IV

#### Postop day of surgery:

- Novalgin 500 mg and Arcoxia 120 mg at around 7 p.m. before discharge
- Targin (oxycodon) 10 mg at around 9 p.m. at home; if necessary the same for the second night

#### Postop the following days:

- Arcoxia 120 mg 1-0-0
- Novalgin 500 mg 2-2-2
- Omeprazol 20 mg 1-0-0
- Oxycodon in the evening only if needed

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<b>Preoperative</b>	<b>Perioperative</b>	<b>Postop day of surgery</b>	<b>Postop days after surgery</b>
Dipidolor 2 mg IV			
Tranexamic acid 1 g IV			
Cefuroxime 1.5 g IV			
Isotonic saline solution 1500 ml IV			

## Appendix

MIS techniques for total hip arthroplasty THA have the potential for reduced tissue trauma, leading to more rapid recovery and return to function than with traditional approaches to THA. However, to achieve these potential benefits, all other aspects of patient care need to be modernised. Development and implementation of these newer anaesthetic and rehabilitation protocols allow MIS-THA to be done safely.

Minimally invasive surgical techniques have become an important component of modern hip replacements. These techniques require minimisation of damage to periarticular soft tissues and conservation of bone substance to the extent possible. The prerequisite for these requirements is the development of an endoprosthesis whose stem is designed both to conserve bone mass and to largely avoid damage to soft tissues, which permits faster restoration of hip function.

Quick functional rehabilitation is supported by the selection of innovative articular interfaces (materials) and especially by the selection of implant designs that support muscle- and bone-saving surgical techniques. These tissue-sparing, minimally invasive techniques facilitate the patient's functional rehabilitation immediately postop and potentially a higher long-term survival rate of the prosthesis.

Another benefit of this type of hip arthroplasty is that fully weight bearing follow-up therapy adjusted to pain is possible and

desirable on the day the surgery is performed. Due to the limited soft-tissue trauma, which results in a significantly shorter recovery phase, outpatient physical therapy can begin after an average hospitalisation of three days. Overall, almost all study participants exhibited early recovery with good results.

