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**VOLUME 20.3**

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This edition of the Journal contains four disparate and varied articles commending local anaesthetic arthroscopy, 3D mesh repair for inguinal hernia repair, fistula-in-ano repair and ambulatory experience in Malaysia.

From the UK, Tyler et al describe their experience of 140 consecutive intra-articular local anaesthetic adult knee arthroscopies, and conclude that the technique is highly reliable, safe and cost-effective and well tolerated by their patients.

From Seville we have an audit of 1840 patients undergoing inguinal hernia repair over an 8 year period using 3D PHS mesh under local anaesthetic with sedation. The authors conclude that the 3D mesh system lends itself to local anaesthetic repair but is also an ideal training technique, allowing the surgical trainee to provide a quality service to the patient while gaining surgical training expertise.

From India, we have a descriptive paper outlining an ambulatory technique for the treatment of fistula-in-ano using sub-mucosal ligation of the fistulous tract in 13 patients. The authors describe their technique in detail and recommend its uptake based on their experience of it being safe and easy to perform.

Finally, from Malaysia we have an overview of the development in recent years of ambulatory facilities and results in that country. This article provides an interesting insight into ambulatory progress in a developing country with a headline day surgery rate of about 30% allowing other similar countries to benchmark their progress.

Happy reading!

Doug McWhinnie

Editor

# 140 Adult Knee Arthroscopies Under Intra-Articular Local Anaesthetic

Mr J Tyler, Dr C Davies, Dr C Toner, Dr A Gupta & Mr R Shrivastava

## Abstract

**Aim:** To analyse the use of intra-articular local anaesthetic (IALA) for therapeutic knee arthroscopy in the day case unit of a UK district general hospital.

**Methods:** Investigation of 140 consecutive adult therapeutic knee arthroscopies. Visual analogue pain scores, patient satisfaction, operative details and difficulties were recorded. Costs were estimated

**Results:** Surgical pain scores varied between 0 and 6 with 87% experiencing no pain. Only 6 patients required intraoperative sedation.

**Keywords:** local anaesthetic, knee, arthroscopy, awake procedure.

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95.5% of patients were satisfied with IALA and 93% would choose IALA during future knee arthroscopies. Employing IALA reduced costs from £59.33 to £17.06.

**Conclusion:** IALA for ambulatory day case arthroscopic knee surgery is highly reliable, safe, and cost effective. It also provides an acceptable experience for patients.

## Introduction

Arthroscopic examination and treatment of the knee is a frequently performed day surgery procedure. There are two commonly used modalities of anaesthesia: general (GA) or regional. Regional anaesthesia often causes motor as well as sensory blockade[1]. This delays mobilisation in the post-operative period and can lead to the procedure becoming less suitable for the ambulatory day case environment[2], thus GA is usually employed.

This study uses an intra-articular local anaesthetic (IALA) technique as the sole anaesthetic modality during day case therapeutic knee arthroscopy.

In the National Health Service, approximately 150,000 knee arthroscopies are performed annually with more than half involving meniscal procedures[3].

Since the late 1970s, IALA has been studied, used and described, but these studies largely involved diagnostic arthroscopy. Despite these widespread descriptions it is not commonly employed in the United Kingdom.

A single surgeon offers an IALA service for knee arthroscopy from one department in Kent, United Kingdom. Prospective data pertaining to this service has been collected. We present the results and our experiences relating to this service.

## Hypothesis

IALA is acceptable to patients, allows all routine intra-articular arthroscopic therapies to be performed and is a safe alternative to general anaesthesia in day case ambulatory therapeutic knee arthroscopy. IALA is also a particularly useful technique in patients not fit for general anaesthesia in the ambulatory or day surgery setting. Furthermore, it avoids the potential complications of spinal or regional local anaesthetic techniques.

## Methods

Prior to starting this study the senior authors applied for and were granted permission for the trial through the hospital Research and Development unit.

## Patient selection

All adult patients listed for knee arthroscopy (usually after diagnostic magnetic resonance imaging) from the lead surgeon's clinic were offered an anaesthetic choice of GA or IALA. The exclusion criteria for IALA were ipsilateral hip arthritis, allergy to local anaesthetic agents or patient refusal of IALA. These patients went on to have their procedures under GA.

## Anaesthetic technique

All the procedures were performed on designated day case local anaesthetic knee arthroscopy lists.

All patients received verbal and written information during routine preoperative assessment.

Initially all patients were kept nil by mouth for 6 hours prior to surgery in case conversion to GA became necessary. This precaution was later removed as it was felt to be unnecessary.

Deep vein thrombosis (DVT) prophylaxis consisted of early mobilisation and compression stockings for all patients. Low molecular weight heparin was prescribed for high-risk patients in accordance with hospital policy.

The anaesthetic protocol was a multimodal analgesic approach. In addition to the intra-articular injection, Paracetamol 1g and Diclofenac 75 mg were given intravenously. If the use of NSAID was contraindicated, Co-Codamol 30/500 was given orally 2 hours prior to the IALA.

**Table 1**

Procedures undertaken	Number
Medial Meniscectomy	73
Lateral Meniscectomy	19
Medial and Lateral Meniscectomy	13
Medial Meniscus Repair (all inside technique)	1
Debridement of Joint Surface	39
Excision of Plica	7
Removal of Loose Body	3

In accordance with strict asepsis the skin of the knee was prepared with alcoholic 10% povidone-iodine solution (Videne Alcoholic Ticture). 2% Chlohexidine gluconate (Ecolab) was used if the patient was iodine sensitive. An anaesthetist performed the IALA injection. It was inserted into the retro-patella pouch, accessed through a lateral approach using a 23G hypodermic needle. During advancement of the needle a negative pressure was applied to aspirate synovial fluid prior to injection.

The IALA consisted of 20mls 2% lidocaine with 1:200,000 epinephrine. The patient was then encouraged to move the knee through 2–3 flexion and extension cycles to move the local anaesthetic through the whole joint. The surgery was commenced 15–20 minutes after the IALA injection.

Rescue analgesia was available in the form of aliquots of fentanyl. An anaesthetist assigned to the operating list administered the anaesthetic protocol.

To use the time efficiently the IALA for the next patient on the arthroscopy list was infiltrated during the preceding patient's surgery. This allowed for zero "anaesthetic time" once the first patient's surgery had begun.

## Surgical technique

The lead surgeon performed all the arthroscopies.

The theatre was prepared for the arthroscopy in a standard fashion. The satellite screen was positioned for the benefit of the patient. A fluid management system was employed. The patient was placed supine on the operating table. No tourniquet was applied. A padded lateral support was used. Standard skin preparation was used.

Prior to skin incision the 2 standard antero-lateral and antero-medial port sites were infiltrated with 5mls of 1% lidocaine .

The arthroscopy was performed as per the surgeon's normal protocol.

1: Initial sequential diagnostic arthroscopy through each compartment.

2: Therapeutic procedures performed.

The operating surgeon conducted constant commentary explaining the procedure. Patients were encouraged to view the arthroscopic images in real time (if they wished).

Closure of the wounds was performed with a single 3-0 polyglactin 910 (Vicryl) subcuticular suture to each wound. The joint was infiltrated with 20-30ml of 0.5% levobupivacaine (Chirocaine) according to patient mass.

The patient was then sent directly to the day-case ward. This bypassed the Post Anaesthetic Recovery Unit, unless patient had received sedation. Discharge was allowed once patient was deemed safe to leave by the ward nursing staff.

Take home post operative pain relief was provided for all patients in the form of simple multimodal analgesia. A choice was given of Paracetamol 1g PO QDS or Co-codamol 30/500 two tablets PO QDS plus optional Ibuprofen 400mg PO TDS PRN.

Patients were seen in the routine orthopaedic outpatient follow up clinic.

The clinic review protocol was:

**2 weeks:** patient education on operative findings, wound review and arrangement of physiotherapy if required.

**3 months:** review to check post-operative recovery and discharge if appropriate.

## Data Collection

A multimodal data collection system was employed.

The surgical team recorded operative details including any difficulties or intraoperative pain in addition to patient satisfaction and willingness to undergo the procedure again. Two weeks later the final satisfaction and post-operative pain was recorded again along with willingness to undergo the procedure again under IALA. Any complications were recorded.

The anaesthetic team employed a visual analogue pain score to measure the worst pain the patient experienced both during the IALA injection and intra-operatively.

## Results

There were 140 patients that underwent local anaesthetic knee at the time of data collection.

The patients' ages varied between 26 and 89 years of age. ASA ranged from 1–3 with over half being between ASA 2 and ASA 3. The highest BMI measurement was 48.

128 (91%) gave immediate feedback. The remaining patients were discharged from the ward prior to surgical team post-operative ward round. 111 (79%) gave both immediate feedback, and feedback in clinic at their first clinic appointment. Some patients were seen in the follow up clinics other than lead surgeon's clinic, affecting data collection.

6 patients requested sedation (4%). There were no conversions to general anaesthesia.

Surgical time varied between 15 and 35 minutes.

The full remit of common arthroscopic procedures were performed with some patients undergoing more than one procedure. (table 1)

The pain visual analogue score during the IALA injection ranged from 0 to 10 with 53% of patients scoring 0–3 (mild), 30% 4–7 (moderate) and 17% 7–10 (severe). During surgery the pain score varied between 0 and 6 with 87% experiencing no pain and 13% experiencing pain score 4–6. These patients received aliquots of fentanyl as rescue analgesia. The dose ranged from 10–30 mcg fentanyl.

The surgeon's reported intraoperative difficulties included three knees that were found to be tight and difficult to navigate. Although

no tourniquet was used there were no reports of poor vision due to blood in the operating field.

In this series no patients suffered vasovagal episodes or required an overnight stay. There were no DVT's.

There was one readmission with knee pain. This patient underwent a re-arthroscopy under GA for clinically suspected joint sepsis. The samples sent for microbiological analysis showed no bacterial growth. The patient made a rapid and complete recovery.

## Patient satisfaction

Of the patients that gave immediate feedback 99% were satisfied with the anaesthetic technique and 98.5% would opt to undergo the same anaesthesia for a further knee arthroscopy. In clinic 2 weeks later, 97% had satisfactory levels of post-operative pain, 95.5% were satisfied with the operative experience and 93% would undergo the procedure again under local anaesthesia.

There was some valuable qualitative feedback from the participants; a number reported that watching their procedure on the satellite screen was valuable in understanding their pathological condition. Thus reflecting the value of patients' interactive experience.

## Costs

There was a small cost saving found in performing the procedure under IALA. The anaesthetic cost reduced from £59.33 to £17.06 (Table 2). IALA technique does not require scavenging of anaesthetic gases, and consequently is more eco-friendly in the operating room environment.

## Discussion

This study shows that IALA is an acceptable anaesthetic technique for knee arthroscopy.

Previous studies have established that intra articular IALA is safe in respect to circulating levels of local anaesthetic[4,5]. One study has shown that basic arthroscopic procedures can be performed under IALA[6] but this study found problems with visualisation of the joint as no epinephrine was used in the local mix. In other studies comparing GA versus IALA for knee arthroscopy, technical difficulty and patient satisfaction were comparable[7–9]. Furthermore rates of reoperation were also similar[10,11].

There are a number of advantages to IALA compared to GA. Patients may have a better understanding of their condition if IALA is used[12]. IALA has also been shown to be more cost effective than GA[13,14].

The results described here are in line with the literature previously published. Only 4% required sedation, slightly lower than the 7–8% found by both Jacobson 2000[15] and Charalambous 2006[12].

Previously it has been noted that local anaesthetic knee arthroscopy is both acceptable to patients and as successful in providing the surgeon with a safe, pain free working environment as general anaesthesia[15–17]. This study underlines the fact that in a standard district general day case surgical unit local anaesthesia knee arthroscopy is a realistic and viable proposition.

The NHS tariff (government funding) for an elective diagnostic knee arthroscopy on a patient with no co-morbidities is currently £1,092

**Table 2** Costs (based on NHS procurement prices) per case.

Items	GA	LA
Sundries	Same	Same
Propofol	£ 4.18	nil
Fentanyl (100mcg)	£0.75	nil
Anti-emetic (ondansetron +/- dexamethasone)	£5.80	nil
Anaesthetic gases, O <sub>2</sub> and Air	£7.60	nil
Laryngeal mask	£3.50	nil
20mls lidocaine with 1 in 200,000 adrenaline	nil	£1.77
NSAID (Diclofenac Sodium (75mg IV))	£4.80	£4.80
Paracetamol (1g IV)	£1.20	£1.20
20mls 0.5% levobupivacaine (Chirocaine)	£3.20	£3.20
Recovery and ward nursing	£28.30	£6.09
<b>TOTAL</b>	<b>£59.33</b>	<b>£17.06</b>

(PRB code HB24C), a therapeutic knee arthroscopy tariff in the same situation is £1,654 (PRB code HB23C)[18]. Although the cost saving per case in small (3.8% per diagnostic procedure and 2.5% per therapeutic procedure), arthroscopy is a commonly performed procedure and during this study there was a theoretical cost saving of £5880.

Undoubtedly patient focused multidisciplinary teamwork was key to the success of this service. Patient selection is a key factor: only patients keen to undergo the procedure under IALA were put forward for the surgery. It is of note, however, that during the study period the operating surgeon was able to safely complete a number of knee arthroscopies on patients that had been deemed unfit for GA.

The surgeon was happy to communicate with the patients during the surgical procedure, maintaining a commentary to reassure the patients and explain findings and procedures. This was an additional important factor in achieving patient satisfaction.

## Limitations

There is a learning curve for surgeons as it may not be suitable for surgeons who are not at ease with an awake patient and cannot operate whilst having an interactive session with the patient.

Patients were asked if they would opt for IALA rather than GA in the future if another procedure was required. Most had no prior experience of GA to compare the two anaesthetics, this could affect their ability to decide on which they would choose in the future. Finally, the protocol used makes no provision for training of either surgeon or anaesthetist.

## Conclusion

The technique documented in this study uses a combination of strategies taken from the previous descriptions to provide a highly reliable technique that allows a safe, cost effective and acceptable experience for patients undergoing ambulatory day case arthroscopic knee surgery.

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# Experience in Day Surgery with prolene hernia system (PHS)

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## Abstract

**Aim:** The aim of this study was to evaluate the outcomes of inguinal hernia repair with prolene hernia system (PHS) mesh under local anaesthesia with sedation as a day surgery procedure within a surgical training programme.

**Patients and Methods:** 5450 patients with inguinal herniae were admitted for hernia repair between 1997 and 2005 in our day surgery unit. 1840 inguinal hernias were repaired with PHS during this time, 1002 patients were operated by residents (54.54%) under staff supervision. Patients were followed-up at five years post-operatively and the outcome measures of pain and complications recorded. Trainees and staff surgeons were assessed by an evaluation of both knowledge and technique.

**Keywords:** inguinal hernia, prolene hernia system, local anaesthesia, day case surgery, training programme.

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**Results:** Local anaesthesia with sedation was used in 97.4% (1793) of patients; regional anaesthesia in 45 (2.49%); conversion from local to general anaesthesia was required in two patients (0.2%). Mean operation time was 40 min, including anaesthetic preparation. Mean hospital stay for all patients was 6 hours. The evaluation of hernia repair with the PHS system was similar between the staff members and residents.

**Conclusion:** Inguinal hernia repair using the PHS technique under local anaesthesia with sedation is feasible on a day case basis and is a suitable procedure for training in a residency programme.

## Introduction

Inguinal hernia is one of the most common surgical procedures performed worldwide. Many surgical techniques have been implemented for inguinal hernia repair, using both the open and laparoscopic approaches. In the early 1990s, tension-free techniques became the gold standard for hernia repair. Learning the inguinal hernia approach is very important to the resident training in general surgery. In our training centre, the trainee starts learning the PHS technique, and once mastered, progresses to other procedures. The bilayer polypropylene mesh device and the prolene hernia system (PHS) for inguinal hernia repair (so-called '3D' meshes) were introduced in 1998. The PHS system combines many of the advantages of the earlier tension-free repair techniques while offering anterior and posterior reinforcement of the hernia defect. This is attributed to its three components comprising the underlay patch (for preperitoneal placement), the onlay patch (for subfascial placement) and the connector which joins the two patches and acts as a plug.

We present a retrospective study of 1840 cases treated in our Ambulatory Unit of both primary and recurrent inguinal hernia repair using 3D mesh. Inclusion criteria included: patients ASA I, II, or stable III patients, absence of recent upper respiratory tract infection, absence of significant past or family history of problem with anaesthesia, age less than 80 years, body mass index <40, availability of responsible adult to escort home with care for 24 hrs, easy access to a telephone and indoor toilet.

## Patients and Methods

1840 patients with inguinal hernia were included (147 women [8%] and 1693 men [92%]), who attended the ambulatory day surgery unit from 1997 to 2005. All patients were operated on an elective basis and follow up at 5 years.

Preoperative routine laboratory tests and electrocardiography were conducted in the outpatient clinic. Patients were questioned regarding other systemic diseases, allergic reactions particularly to anaesthetic agents, and current drug history.

Informed consent was obtained before surgery and included patients' approval for performing the hernia repair using the PHS mesh under local anaesthesia with sedation. All patients were admitted on the morning of surgery. Patients were discharged between six and eight hours post-operatively.

One hour before surgery, oral midazolam (0.5–2.0 mg) was administered.

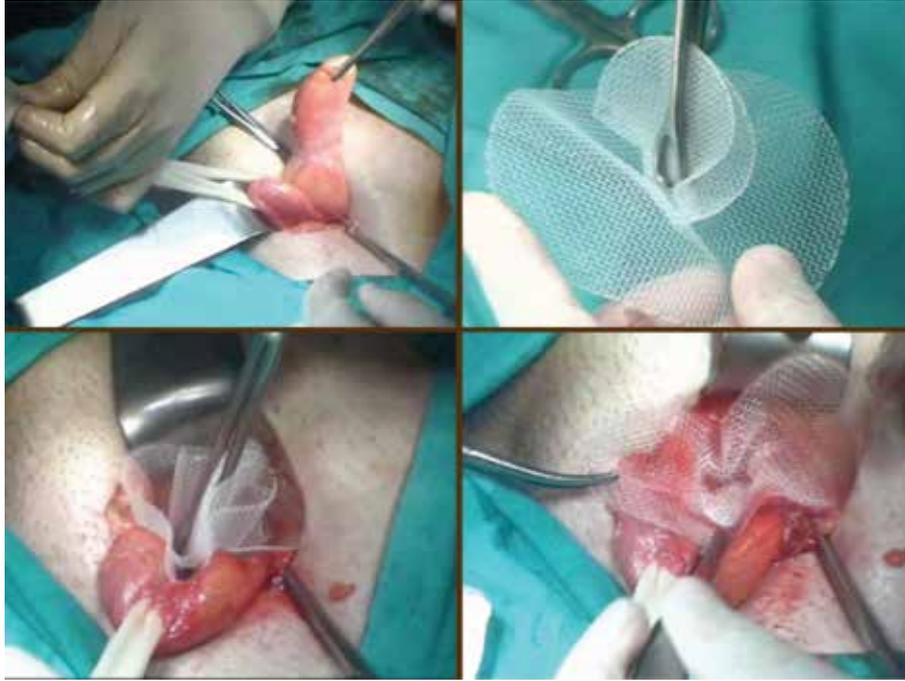
Local anaesthesia was performed by the operating resident. Conversion to general anaesthesia was indicated for failure of local anaesthesia after maximal sedation had been administered.

### Local anaesthesia and sedation technique

Patients were sedated with propofol (0.5 ml/kg) before the local anaesthesia by the surgical trainee. For local anaesthesia, the residents used a combination of bupivacaine with 1:200,000 adrenaline (1% solution) and lidocaine (5%) up to 60ml. Twenty ml of physiological saline solution, 10 ml of lidocaine (5%) and 10ml of bupivacaine with Adrenaline were mixed. Standard anaesthetic monitoring of vital signs was maintained during the injection of the local anaesthetic agents and throughout the procedure. The iliohypogastric and ilioinguinal nerves (T12 and L1) were blocked by the injection of 10 ml of local anaesthetic into the oblique muscles medial to the anterior superior iliac spine; another 10ml was injected around the external ring, a further 10 ml lateral to the pubic tubercle, 10 ml in the other side of the inguinal ring, and the final 10 ml are injected in the line of the incision. During surgery, local anaesthetic can be injected into the hernia sac and/or the muscle layers. (Figure 1)

Hernia repair technique: PHS was used for all repairs. This 3D mesh comprises two layers; an ellipsoid onlay layer, and an inferior circular

**Figure 1 Inguinal Hernioplasty with PHS.** There is a big direct hernia treated with PHS hernioplasty. In the picture we introduce the mesh directly in the hernia defect, expand the circular inferior layer in preperitoneal space. Finally the superficial layer is fixed with a cardinal point.



layer introducing into the preperitoneal space; both layers are joined by a connecting cylinder of mesh acting as a plug into the internal ring.

In both direct and indirect hernia repair, the hernia sac was dissected and reduced into the abdominal cavity. A preperitoneal space was then created behind the transversalis fascia for the placement of the deep layer of the PHS mesh. The dissection was done with the finger and with gauze separating the preperitoneal space. The superior layer was trimmed laterally to create an opening for the spermatic cord and fixed with a suture.

A critical step of the PHS mesh technique was the fixation of the superficial onlay layer to the pubis by a 2/0 prolene suture, with a maximum of 4 further sutures fixed at the cardinal points of the inguinal ligament and the conjoined tendon. Care was taken to avoid entrapping nerves in the stitches. (Figure 2) Postoperative pain was assessed using a visual analogue scale pain rating scale. Mild and moderate postoperative pain was managed with simple analgesics (metamizol) with or without non-steroidal anti-inflammatory drugs (NSAID).

## Assessment of knowledge and surgical skill

### Participants

Members of the staff: 6 senior surgeons experimented in inguinal hernia repair, working full-time in the ambulatory day surgery centre.

Residents: 25 residents (3 months of their surgical rotation).

Assessment: To compare the differences between residents and surgeons trained in this technique we used a scale designed by the tutors in our Ambulatory Centre (1).

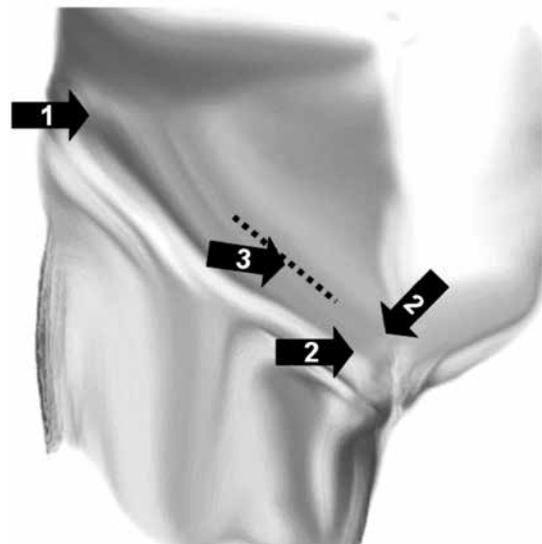
A) Knowledge about the mesh: 0–5

B) Knowledge about the sutures: 0–5

C) Surgical technique: 0–5

### Figure 2 Local anaesthesia technique

1. First point: antero superior iliac spine, two-three centimeter to midline.
2. Second actuation (I): infiltration of external inguinal ring in midline face. Second actuation (II): infiltration of external inguinal ring in outside face.
3. Final point: superficial infiltration in the line of the incision, and direct through this line to the subcutaneous fatty tissue midline.



1. Dissection of inguinal hernia: 1
  2. Dissection of the hernia sac: 1
  3. Identification of structures (Inguinal cord, Cooper's ligament, fascia transversalis, etc.): 1
  4. Ability to accurately place the mesh (introduction and placement of the two layers of the mesh): 1
  5. Sutures (fixation and knotting): 1
- D) Surgical advice discharging the patient: 0–5  
E) Follow-up: 0–5

**Table 1** Comparative method to evaluate and compare the result of the resident and the staff members.

Comparative Method						
A) Knowledge about the PHS mesh	0 Nothing	I Materials	2 I and Parts of the mesh	3 I,2 and Sizes	4 I,2,3 and Placement of the layers	5 I–4 and Integration of the materials
B) Knowledge about the sutures	0 Nothing	I Types of sutures Reabsorbables-Non reabsorbables	2 I and Knotting	3 I,2 and Placement of the sutures	4 I,2,3 and Correct Suture in simulators	5 I–4 and Integration and duration of the materials
C) Surgical technique	0 Nothing	I Dissection of inguinal hernia	2 Skelitization of hernia sac	3 Identification of structures	4 Facility and skill to place the mesh	5 Sutures in the mesh
D) Surgical advice discharging the patient	0 Nothing	I Simple information	2 Basic information: result	3 I,2 and Anesthetic and surgical technique	4 Advance information: About the mesh	5 Complete information
E) Follow-up	0 Nothing	I Follow-up on discharge of the patient	2 I and Telephone Follow-up	3 I,2 and Follow-up 1 month in clinic	4 I,2,3 and Follow-up 3 month in clinic	5 I–4 and Follow-up 6 month in clinic

The results were recorded as follows:

Each surgeon received a combined score ;  $(A+B+C+D+E)=F$ .

The sum of “F” was averaged among the participating surgeons whether trainees or experienced surgeons with a maximum score per participant available.

The range was: 0–5 (poor result), 5–10 (normal result), 10–20 (good result), and 20–25 (very good result).

The assessment was performed at the end of the resident’s rotation by the tutor. Staff members were evaluated by the centre’s chief of staff.

## Results

1840 patients with inguinal hernia, 147 women (8%) and 1693 males (92%), admitted in the criteria of day surgery. Mean age of the patients was of 56 years (range 18-82 years).

Herniae were classified according to Gilbert’s classification: type I n=15 (0.81%), type II n= 49 (2.7%), type III n=736 (40%), type IV n=939 (51.3) and type V n=101 (5.5%). Primary hernias comprised 92.0% (1692) of patients while recurrent hernias accounted 148 (8.0%).

Anaesthesia: Local with sedation n=1793 (97.4%); Regional block n=45 (2.5%); General anaesthesia n=2 (0.1%).

PHS Sizes: Normal: n=376 (20.4%); Large:n=801 (43.5%); Extra-large: n=663 (36.0%).

Mean operation time was 40 mins (range 30–80 mins), including time to anaesthetise.

The overall hospital stay was 5-8 hours, with a mean of 6 hours; 1748 (95%) had a stay less than five hours, 81 (4.4%) had a stay less than 23 hours, and a 11 patients (0.59%) stayed overnight.

Staff surgeons performed 838 repairs (45.5%) and residents 1002 (54.5%) supervised by trained surgeons.

### Postoperative pain management

At 3 months follow-up: B) 6 (0,3 %)

Recovery without complications n=1830 (99.4%)

Post-operative complications (pain, haematoma, seroma, infection) n=6 (0.3%) Chronic pain or hernia recurrence n=4 (0.2%)

Postoperative pain intensity of was mild (2–4 points) in 31.5%, moderate (4–6 points) in 54% and severe (6–8 points) in 14.5% of cases in the day of surgery. All cases were alleviated with a NSAID with or without paracetamol. On the first postoperative day all patients were managed with simple analgesics (metamizol) with or without non-steroidal anti-inflammatory drugs (NSAID).

### Comparison of trainees and experienced surgeons

Surgical outcomes comparing trainees and experienced staff were similar

Staff members:  $A(4.5)+B(4)+C(5)+D(5)+E(4)= 22.5$

Residents:  $A(3.5)+B(4.5)+C(5)+D(4.5)+E(3)= 20.5$

## Discussion

The results of inguinal hernia repairs performed with the PHS 3D technique in our unit are comparable to those achieved with a standard Lichtenstein hernia repair. Inguinal hernia repair using the PHS technique under local anaesthesia could be mastered by most of the surgeons in our hospital with minimal morbidity and short hospital stay with a minimal recurrence [1,2]. This is one of the principal reasons to teach this technique in our training resident programme. Once the trainee has mastered the PHS technique, they can advance to the other common surgical techniques such as Lichtentein, Stoppa, McVay, Rutkow-Robbins, etc.

In a randomized clinical trial of Lichtenstein patch vs Prolene Hernia System for inguinal hernia repair in 2006 [3] the median duration of operation for unilateral primary hernia was 37 min for the Lichtenstein operation and 27 min for the PHS procedure ( $P < 0.001$ ). Postoperative pain was similar after both operations. Median sick leave was 7 days in both groups. Time to driving a car was 4 versus 3 days, and time to return to sporting hobbies 13 versus 11 days, in the Lichtenstein and PHS groups, respectively. Beside a residual femoral hernia after Lichtenstein repair, no recurrent inguinal hernias were detected [3] but the PHS procedure takes significantly less time to perform [1,4]. Hence our rationale for using the PHS technique as our standard technique for teaching hernia repair.

There are only a few data regarding the long-term outcomes of prolene hernia system (PHS) mesh in the published reports. When we compare the short-term and long-term outcomes of the PHS mesh with the Lichtenstein mesh technique in two studies there is no significant difference in the early and long-term outcomes between PHS and Lichtenstein hernia repairs [5,6].

PHS technique involving preperitoneal dissection is well tolerated and easy to carry out under local anaesthesia [7]. Local anaesthesia lends itself to ambulatory surgery and is especially useful in patients with severe co-morbidities, where general anaesthesia would be high risk. It also provides four-five hours postoperative analgesia which can be easily administered by the surgeon [2,7]. The PHS technique can also be applied to other types of hernia repair such as epigastric and umbilical hernia; with good results in all cases [8].

In a study of efficacy of Bilayer Mesh Device compared with the gold standard Lichtenstein onlay mesh for inguinal hernias, there were significantly lower recurrence rates for the PHS technique in early results. Additionally, in the PHS mesh group, there was a trend toward decreased overall complication rates with significantly less seroma/hematoma rates. Therefore, the PHS mesh repair may represent a superior alternative for the repair of inguinal hernias [4]. It is a safe and effective technique for inguinal hernia training for trainees, with similar results to staff surgeons with less operative time than with other inguinal hernia techniques [7,9]. We have therefore concluded that the PHS technique is a safe and reliable procedure with low rates of complication, recurrence, and late symptoms in both early and long-term follow-up [10].

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# Submucosal Ligation Of Fistula Tract (SLOFT) for ano-rectal fistula: An effective and easy technique

Dilip Umakant Pathak, Vikesh Agrawal & Dr V K Taneja

## Abstract

The ideal treatment for ano-rectal fistula should aim towards low recurrence, early recovery and minimal incontinence. The various techniques are described for management of ano-rectal fistula and LIFT (Ligation of Inter-sphincteric Fistula Tract) and VAFT (Video-

Assisted Fistula Treatment) are the techniques in vogue but have their disadvantages. We describe the technique of Submucosal Ligation Of Fistula Tract (SLOFT) for ano-rectal fistula which we believe is an effective technique with the advantage of better cosmesis.

**Keywords:** anorectal fistula, fistula-in-ano, submucosal, ligation.

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## Introduction

Ano-rectal fistula is a complex disease with variety of options for its management such as fistulotomy, fistulectomy, seton, plug, fibrin glue occlusion, ligation of inter-sphincteric fistula tract (LIFT) and video-assisted fistula treatment (VAFT). [1-3] LIFT is associated with high recurrence and is technically difficult. [4] There remains a search for a technique which is cost effective, easy to learn, teach and perform and is associated with minimal complications. We describe the technique of Submucosal Ligation Of Fistula Tract (SLOFT) for ano-rectal fistula.

## Method

A prospective study was carried between January 2014 and April 2014 in the colorectal unit of Jabalpur Hospital and Research Centre. All cases with ano-rectal fistula were included irrespective of their age, sex, co morbidities, pathology and recurrence. Cases with malignancy and tuberculosis were excluded. After systematic history taking and general examination, a digital rectal examination (DRE) was performed to palpate the internal opening and the tract. The fistula was classified according to Park's classification. Ultrasound and other imaging techniques are not performed routinely in the unit's practice but are done selectively in multiple fistulae. Standard oral bowel preparation was performed with a rectal enema. Single dose antibiotic prophylaxis consisting of intravenous cefuroxime injection was given at induction. All cases were performed under spinal anaesthesia with the patient in lithotomy position.

*Technique:* Internal speculum examination is performed after gentle anal dilation to identify the internal opening/s. Saline solution or weak methylene blue is instilled through the external opening to aid in visualization of internal opening/s. A pliable copper probe is then inserted to aid the identification of the tract/s. Sub-mucosal and peri-tract injection of 2ml of 2% Xylocaine with 1:200,000 adrenaline is performed to minimize bleeding. An incision is made in the mucosa of the anal canal over the tract, 1.5 cm from the internal opening.

The tract is identified over the probe and is dissected all around to the nearest point possible to the internal opening in the sub-mucosal plane. The tract is ligated and divided with Polyglactin-910, 2-0, suture after withdrawal of the probe. 0.5 cm of tract is excised beyond the division, for histopathology. The mucosal incision is left unclosed and with a betadine pack for several hours. (Figure 1, 2) Patients are routinely advised post operatively regarding warm baths, cleansing the area, oral diclofenac pain relief, local antibiotic application and stool softener. Patients were followed weekly for the first month and then fortnightly for 3 months, and on each occasion examined for healing, abscess, recurrence, stenosis and incontinence.

## Results

This SLOFT technique was performed on 13 patients with a male to female ratio of 9:2 and the age range was 22–48 years. The distribution of fistula types according to Park's classification was: inter-sphincteric (9, 69.2%), trans-sphincteric (2, 15.3%), supra-sphincteric (1, 7.69%) and horse-shoe variant (1, 7.69%). One patient had non insulin dependent diabetes mellitus which was controlled medically before surgery. Mean hospital stay and days to return to work were 2 days and 5 days respectively. Follow-up ranged from 9 days to 3 months. One patient developed a sub-mucosal abscess at the site of surgery on the 60th post operative day which was treated with surgical drainage. As there is no scar in the skin, the cosmesis was excellent. None had stenosis or incontinence in the mentioned follow-up.

## Discussion

The ideal treatment for ano-rectal fistula should aim towards low recurrence, early recovery and minimal incontinence. [1] The various techniques described for management of ano rectal fistula are fistulotomy, fistulectomy, seton, plug, ligation of inter-sphincteric fistula tract (LIFT) and video-assisted fistula treatment (VAAFT). [1] LIFT and VAAFT are the techniques in vogue following the concept

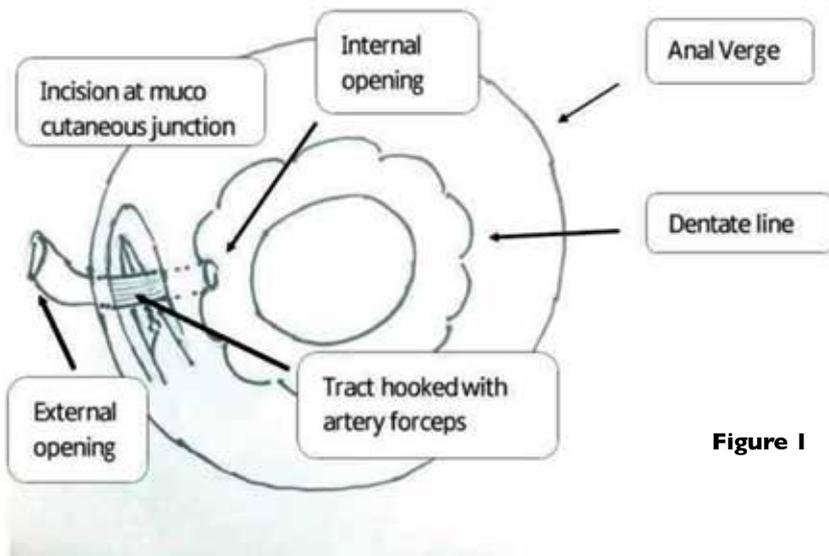


Figure 1

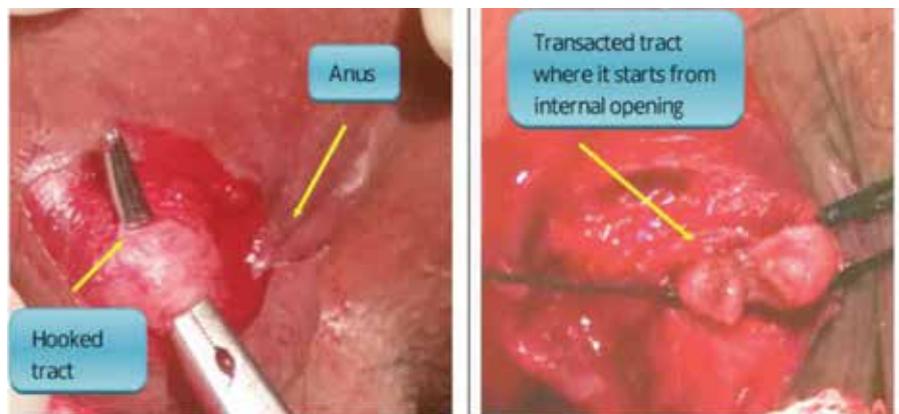


Figure 2

of ligation and division of fistula tract under vision but have certain limitations. [2,3] LIFT had advantages of lesser recurrence and minimum morbidity in terms of wound complications and continence but it is technically more demanding especially in high and ascending tracts, has higher chances of intersphincteric abscess, has chances of internal sphincter damage and leaves an external scar. [1,3,4] VAAFT has better visualization, is less invasive, obliterates whole of the tract, has lesser chances of recurrence and has better cosmesis but involves limitation of availability and is cost-ineffective. [3]

There is always a need of a procedure which is easy to learn and teach, has lesser complications, early recovery and cost-effective. We believe SLOFT has all those advantages. Moreover, it avoids disadvantage of LIFT of going through the inter-sphincteric planes and the potential for sphincter damage, especially in the hands of a novice and gives no external scar. It has both the advantages of LIFT and VAAFT. The limitation of the SLOFT is the need of a mature tract for ligation and is not applicable for acute ano-rectal fistula or associated inflammation. One of the patients in the present study had a perianal abscess formation that had diabetes and acute ano-rectal fistula with a friable tract and is the only complication in present study. The abscess which developed in the present case was sub-mucosal, which was easier to manage as compared to inter-sphincteric abscess seen in LIFT. Although LIFT and VAAFT stays as good procedures for ano-rectal fistula in the hands of experts and equipped, but they are technically more demanding and have not stood in the test of clinical trials. [5] SLOFT is an easy, effective and safe technique, but a long-term study and follow-up on larger number of patients is needed.

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# Day surgery in a developing country – the Malaysian experience

C.Y. Foo & S. Sivasampu

## Abstract

**Aim:** To study the scope, practice and status of day surgery in Malaysian public Ambulatory Care Centres.

**Methods:** Data from 2011 and 2012 was collected using a pre-tested questionnaire from 8 ACCs.

**Results:** All centres provided day procedures in 6 basic specialties: general surgery, ophthalmology, orthopaedic, otorhinolaryngology, gynaecology and dental surgery. Overall the day surgery rate was about

30%. The operating workforce and facilities available were suboptimal. 20% of procedures performed using day operating resources were of inpatient/emergency nature. Selected Key Performance Indices were achieved.

**Conclusion:** Day surgery is still sub-optimal in terms of its utility and resources available for services provision.

**Keywords:** Day surgery; Ambulatory Care Centre; Day surgery rate; Malaysia.

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## Introduction

The concept of day surgery (DS) in Malaysia had its beginnings in 1980. [1] What prompted this move was the inability of the hospitals within the Ministry of Health to cope with the over-utilisation of hospital beds. In the interest of cost and efficiency, the Ministry of Health, spearheaded by the Medical Development Division (MDD), embarked on a policy of investing in the infrastructure for day surgical services. It defined DS as any scheduled procedure provided to patients without the need for overnight admission and which is completed within the same calendar day. [2] The policy provided protocols on the scope, objectives, and organisation for purpose built Ambulatory Care Centres (ACC). In addition to this, the Day Care Anaesthesia protocols established by MDD and the Task Force for Day Care Anaesthesia Services provided, amongst others, guidance on the work-flow, listing of procedures suitable for day surgery, the guidelines for patient selection, their pre-operative assessment and the instructions on discharge tailored to the local setting [1].

The first dedicated ACC in the Ministry of Health was established in 1987 at Ipoh Hospital [1]. To date, 15 ACCs have been built within the Ministry of Health. Most of these ACCs are stand alone units within the hospital sites. Six more have been planned under the 10th Malaysia Plan 2010-2015 according to the recently published Malaysia Health System Review. [3]

However, little is known about the services that have been provided, the facilities that are actually available, the workforce involved and the quality of services of these ACCs. We undertook this study to gather information on these issues, hitherto not officially known.

## Study setting and methods

From 2011 to 2012, there were 13 ACCs providing day surgery services within the Ministry of Health. From these 13 centres, we captured information from only five stand-alone and three integrated ACCs. The reasons for excluding the other five centres were either because they admitted all patients overnight, were operating beyond office hours or were performing procedures only under local anaesthesia. The centres were also sampled such that they represented

different regions of the country.

A pretested questionnaire was used to capture the information under the following sections:

1. Facility: number of functioning operating rooms, recovery spaces and day care beds
2. Activity: day surgical services by specialty, total number of elective inpatient, emergency and day procedures (overall and for 4 index procedures i.e. inguinal hernia repair, laparoscopic cholecystectomy, tonsillectomy and cataract surgery). In addition, the number of inpatient and emergency surgery (I&ES) performed using day operating facility was analysed. The choice of index procedures was determined by an expert panel of anaesthetists and surgeons in order to benchmark the DS activity in these 8 ACCs
3. Operative Workforce (support staff): number of anaesthetic assistants, recovery room nurses and scrub nurses.
4. Four quality measures or key performance indices (KPI) selected were:
  - a. No-show rate (NSR) = (Total number of patient not attended on day of procedure without prior notice) / (Total number of day procedure)
  - b. Unplanned admission rate (UAR) = (Total number of patient admitted to inpatient ward after day procedure) / (Total number of day procedure)
  - c. Cancellation rate (CR) = (Total number of cases cancelled due to patient or facility factor(s)) / (Total number of day procedure)
  - d. Percentage of cases performed using day operating facility for inpatient & emergency purposes (PIEP) = (Total number of inpatient & emergency cases performed in the day OR) / (Total number of cases performed in the day OR)

This pretested questionnaire was initially drafted and distributed to 5 of these 8 centres prior to the actual study. Feedback was gathered from these centres with regards to the practicality of such

data collection questionnaire. Necessary adjustment was made after multiple reviews. The final questionnaire generated through this process was used for the actual study.

The data collection process was initiated by briefing the respective ACCs staff and assisted by the site investigators. The sources for the data collected included administrative documents, operating room census and operating lists during the study period.

From the information gathered, the following outcomes of interest were presented as:

1. The number and scope of the day surgical services provided in the various Centres
2. The day surgery rates (DSR) for the overall and index procedures and expressed as:  
(Total number of day surgical procedure) / (Total number of elective surgical procedure). Elective Caesarean sections were excluded.
3. The number of operating facilities and the workforce involved
4. The four selected quality measures or KPI of day surgery practice alluded to above.

Because of confidentiality, the hospitals names are removed and are replaced by alphabets (site A-H).

## Results

### Scope of Day Surgical Services

Table 1 shows the characteristic of the eight sites. Site H appears to be an outlier when compared to the rest. This is because the hospital is located in the Federal Government Administrative Capital where the hospital setup and characteristics of the catchment population were different.

Seven out of the 8 sites provided DS for all these surgical disciplines i.e. general surgery, ophthalmology, orthopaedic, otorhinolaryngology, gynaecology and dental surgery. Half of these sites also provided plastic surgery. One (site B) reported performing vascular surgery. Others (site C, E, H) had either neurosurgery, urology or breast-endocrine day services in addition to the basic ones (Table 1).

### Day surgery rate (DSR)

Table 2 summarises the overall day surgery rate (DSR) and the DSR of the 4 index procedures for 2011 and 2012. The overall DSR for both years was below 30%. However, this improved for most sites and for the three out of the four index procedures over the two years. The exception was for cataract surgery which showed a slight decrease. Overall, site C appeared to have outperformed all other peer sites. In 2012, only two sites performed day surgical laparoscopic cholecystectomy. Half of these sites have yet to perform any tonsillectomy.

### Operating Facilities and Workforce (support staff):

For 2012, the average number of functioning day operating rooms (ORs) was 4.5 per site (range: 1–7) (Table 3). The mean ratio of functioning recovery space to OR was 0.9 while the mean functioning day bed was 32.8 (range: 16–50). Furthermore, the mean ratio of Anaesthetic Assistance (AA) to OR, Recovery Nurse (RN) to Recovery Bay (RB) and the Scrub Nurse (SN) to OR was 0.6, 0.5 and 2.0 respectively. Though not displayed (Table 3), this ratio was constant for 2011 and 2012.

### Quality measure or Key Performance indices (KPI)

Table 4 summarises the quality measures or Key Performance Indices

selected namely, the unplanned admission rates (UAR), the no-show rates (NSR), the cancellation rates (CR) and percentage of cases performed in day operating theatre for inpatient and emergency purposes (PIEP). Except for PIEP which showed a 23 to 31% rate, the rest were below the 5% target.

## Discussion

We set out to investigate the latest scope & practice status of day surgery (DS) in the country. Notwithstanding the difficulty in data collection, we used a pretested survey questionnaire that was designed to capture and report the best possible statistics in our local context. Furthermore, the process was assisted by field investigators in order to ensure the quality of the data.

Overall, the DSR was below 30%. However, there was a slight improvement from 2011 to 2012. Seven out of the eight Centres provided DS rate in general surgery, ophthalmology, orthopaedics, ENT, gynaecology and Ear nose and throat surgery. Furthermore, the rate for the index procedures was encouraging and there was a general improvement over the two years. Besides the alarming 30% of inpatient & emergency procedures performed using day OR, other key performance indicators such as unplanned admission rates, no show rates and cancellation rates were within expectation.

Despite some shortcomings, our results show an improvement from that reported by Inbasegaran K who showed that in 1996, the DSR was less than 5% in Malaysia (as cited in Norsidah, 2001). [4] In 1998–2000, the DSR in a tertiary teaching hospital in Malaysia was found to be around 14%. [4]. Our finding of 29% appears to follow a positive trend. Similar DSR has also been reported recently in other developing country such as Nigeria. [5] Yet, literature on day surgery in the developing world is sparse, making comparison and tracing of its development difficult.

Though the movement is encouraging, it is evident that day surgery is still not sufficiently established in the country despite the resources and effort invested. A few factors may explain the relatively poor state. However, the lack of solid evidence may make our interpretations a mere speculation. Firstly, many surgeons may still believe that day surgery is unsafe; some may not be willing to take up the extra effort and responsibility of managing DS patients [6]. From personal communication with the Chairperson of Day Surgery Service in Malaysia, that may be the case in this country. (Yan YW, MOH Malaysia Day Surgery Service Chairperson, MD, FRCS (Aug 2013))

Funding may be an additional problem. There is no incentive for surgeons in the MOH to encourage DS and additionally, there is no separate budget for day surgical services in the MOH. Lastly, lack of clinical leadership and inadequate support staff may have further contributed to the lack of progress. These factors have been shown to be important in ensuring higher output and quality of day surgery services. [6]

What was of concern was that, a significant proportion of cases performed in the day operating rooms were for inpatient and emergency purposes. The most likely reason may be the high un-met demands for inpatient and emergency operation in MOH hospitals as reported in the National Healthcare Establishment and Workforce Survey 2011. [7] This inappropriate use of day operating resources may defeat the purpose of DS. Some may argue that this problem could be improved, if more surgery were to be performed as day cases, sparing the inpatient operating resources for real emergencies and cases that truly required full inpatient care. This issue needs to be examined closer in order to understand the inter-relation of factors

**Table 1** Hospital Characteristics and Scope of Day Surgical Services available in the eight Ambulatory Care Centres.

Site	A	B	C	D	E	F	G	H
Region	Southern	West Coast	Northern	Northern	Central	Central	West Coast	Central
Estimated Population Catchment ('000) <sup>1</sup>	833	476.5	781.5	527.3	690.6	879.2	350.7	76
Hospital Bed Strength <sup>2</sup>	901	759	990	1107	880	893	821	278
Bed per 1000 population <sup>2</sup>	1.08	1.59	1.27	2.10	1.27	1.12	2.34	3.66
Bed Occupancy Rate(%) <sup>2</sup>	85.1	80.7	69.8	81.2	64.9	94.3	74.2	101.2
Scope of Day Surgical Services	b, c	a, d	a, c, e	a	a, f	a, c	a, c	a, g

<sup>1</sup> Estimation was based on statistics provided by the Malaysia Department of Statistics, Population Census 2011

<sup>2</sup> Statistics obtained from the National Health Establishment and Workforce Statistics 2011

<sup>a</sup> all 7 basic disciplines (Ophthalmology, Obstetrics & Gynaecology, Orthopaedics, ENT, General Surgery, Endoscopy and Dental Surgery),

<sup>b</sup> only ophthalmology and general surgery, c-plastic surgery, d-vascular surgery, e-neurosurgery, f-urolology, g-breast & endocrine surgery

**Table 2** Overall day surgery rate (DSR) and the DSR for 2011 and 2012.

Site	A	B	C	D	E	F	G	H	Overall
Inguinal Hernia Repair (2011)	0%	10%	88%	0%	0%	98%	4%	7%	26%
Inguinal Hernia Repair (2012)	0%	37%	92%	0%	19%	NR	33%	5%	27%
Tonsillectomy (2011)	0%	0%	58%	0%	0%	0%	11%	52%	15%
Tonsillectomy (2012)	0%	24%	43%	0%	0%	0%	64%	32%	20%
Lap Cholecystectomy (2011)	0%	0%	78%	0%	0%	0%	0%	0%	10%
Lap Cholecystectomy (2012)	0%	11%	90%	0%	0%	0%	0%	0%	13%

NR - Not recorded for day surgery

**Table 3** Operating Facilities and Supporting Workforce for 2012.

Site	A	B	C	D	E	F	G	H
Number of Day OR	2	4	6	7	5	5	6	1
Number of RS	2	5	6	8	2	3	3	1
RS : OR Ratio	1.0	1.3	1.0	1.1	0.4	0.6	0.5	1.0
Day Bed	16	48	50	35	34	17	30	33
AA : OR Ratio	0.5	0.5	0.7	0.4	0.2	0.2	1.0	1.0
RN : RS Ratio	0.5	0.4	0.5	0.3	0.5	0.3	0.7	NA
SN : OR Ratio	1	2.8	3.8	2.1	2.4	0.6	1.5	2

OR - Operating Room RS - Recovery Space AA - Anaesthetic Assistance RN - Recovery Room Nurse SN - Scrub Nurse

NA - Information Not Available

**Table 4** Day Surgery Quality Measures (Key Performance Indices) for 2011 & 2012.

Site	A	B	C	D	E	F	G	H	Overall
UAR, 2011	4.2%	0.3%	2.9%	0.0%	NR	1.6%	0.8%	2.7%	1.8%
UAR, 2012	2.1%	0.5%	1.8%	0.4%	0.6%	1.3%	1.6%	2.9%	1.4%
NSR, 2011	0.0%	0.8%	1.6%	NR	NR	NR	0.0%	0.0%	0.5%
NSR, 2012	0.0%	2.1%	1.6%	NR	0.2%	2.7%	0.0%	NR	1.1%
CR, 2011	3.3%	1.4%	0.9%	2.0%	NR	NR	0.0%	3.2%	1.8%
CR, 2012	3.1%	3.5%	1.7%	0.1%	0.2%	1.9%	0.0%	2.4%	1.6%
% I&EC ,2011	0.0%	42.7%	27.3%	NR	23.9%	10.9%	31.1%	NR	22.7%
% I&EC ,2012	0.0%	54.8%	15.0%	58.1%	21.7%	16.5%	48.9%	NR	30.7%

UAR - Unplanned admission rate    NSR - No show rate    CR - Cancellation rate  
 % I&EC - Percentage of cases performed in day operating room for inpatient and emergency purposes

involved. Then carefully planned and implemented policies such as ring-fencing [8, 9] and well defined management pathway may benefit the service.

The limitations of our study are recognised. Firstly, a purposive sampling was chosen to provide a manageable study framework as difficulty in data collection was anticipated due to different hospital administrative practices. Also, hospitals without dedicated day surgical units but providing DS were excluded. Secondly, there was no uniform coding for these day procedures. As a result it may be difficult to standardise across these centres. Similar problems were reported in other countries. [6] Only recently has the MOH trained the records officers to code procedures using ICD-9CM.

Despite these limitations, we believe our study does provide and insight into the state of day surgery services in our public hospitals. These findings may help our policy makers in planning our future directions for DS services and the ACCs. It also allows other similar countries to benchmark their own performances. No doubt, more studies will be needed to explore and understand the reasons for the delay in implementing DS in the country despite all the good evidence of its safety and effectiveness.

## Conflict of interest

We have no conflict of interest to declare.

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