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Editorial

Mark Skues, Editor-in-Chief

The beginning of a new year always brings its own trepidations with dark mornings and long nights (in the northern hemisphere), frost, snow and other unpleasant weather phenomena (again in the northern hemisphere), and a longing for more pleasant times. As the year moves on, feelings ameliorate somewhat, with an anticipation of better things ahead. So it is with the International Association for Day Surgery, and an imminent meeting planned for later this year. Plans are afoot for a second virtual Congress with the Brazilian Society of Ambulatory Surgery, scheduled provisionally for 18th November 2023, the Congress promises a wealth of experienced international speakers delivering on subjects related to Ambulatory Surgery. Point your browsers to www.iaasiberoamerica.com for further details as they develop.

And so to the papers published in this edition. The first is a Portugese review evaluating the role of continuous subcutaneous insulin infusions in the peri-operative period. The paper describes the science behind such infusion pumps and provides useful guidelines for their use during surgery with a wealth of tips and tricks designed to maintain normoglycaemia.

The second paper is from Braga in Portugal evaluating the possibility of remote patient monitoring in ambulatory surgery. The development of telemonitoring software that records and transmits physiological data is relatively new, but opens up possibilities of more significant day case surgery whilst being monitored in their home environment after discharge. The study evaluated 20 healthy volunteers whose heart rate, non-invasive blood pressure, oximetry, respiratory rate, temperature and ECG were monitored for an average period of 15 hours. Body temperature measurement proved to be relatively ineffective with the sensor becoming detached in a quarter of patients. Overall though, the majority of the volunteers felt safer being monitored in this way, knowing that the technology could allow earlier detection of complications.

Kamath and Kamath offer a paper evaluating pinch and grip strength recovery after carpal tunnel release. They found definite improvements in grip and pinch after 4 weeks of surgical release, but full recovery took almost one year after surgery.

The final paper from Egypt compares the benefits of a subcutaneous fatty flap vs a rhomboid flap in the management of recurring pilonidal sinus. The authors studied 50 patients and compared outcomes after the differing techniques. The found greater benefit with the fatty flap use resulting in less post-operative infection, less recurrence and a marked reduction in duration of stay.

As ever, the Journal is always on the lookout for aspiring authors to contribute to its pages. It is a continued challenge to complete each edition with an appropriate number of ambulatory surgery submissions, so, returning to the theme of the new year again, why not make this your new year's resolution?

Dr Mark Skues
Editor-in-Chief

The Perioperative Insulin Pump: Is it an Option?

Ana Mendes Duarte, Carolina Sousa Dias, Maria de Lurdes Castro

Abstract

Continuous subcutaneous insulin infusion (CSII) therapy has become increasingly widespread in the management of diabetes in recent years. However, there is limited published literature outlining the appropriate perioperative use of insulin pumps. Recognizing a need to standardize care, this article aims to assist anesthesiologists in caring for patients with CSII therapy in the perioperative period.

A literature search was conducted in the PubMed database, with the MeSH terms "insulin infusion systems", "diabetes mellitus" and "hyperglycemia". The search was limited to articles published in Portuguese, English and German. The initial search yielded 67 articles that were later selected based on their relevance. Ultimately, 23 articles were addressed.

Answering the question posed in the title of the article: yes, maintaining the insulin pump in the perioperative period is an option. It is important for the hospitals to develop clear protocols for inpatient and perioperative management of patients on CSII, bring forward initiatives to educate healthcare professionals that are likely to encounter this technology and closely liaise with diabetes team. Education is paramount for all staff involved in the care of patients with insulin pumps.

A protocol can contribute to reduce therapeutic misadventures by clinical personnel which are not familiar with CSII therapy, as well as guide goal-directed glycemic and surgical outcomes.

Keywords: Continuous subcutaneous insulin infusion, insulin pump, diabetes mellitus, hyperglycemia.

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Introduction

Continuous subcutaneous insulin infusion (CSII) therapy, introduced in the 1970s, has become increasingly widespread in the management of diabetes in recent years (1). Its use is predominant in patients with type 1 diabetes with particular effectiveness on patients which have not yet achieved target HbA1c levels, although use is increasing in type 2 diabetics (2-5).

Patients with diabetes have a higher propensity to require surgery during their lifetime4. In order to reduce the risk of postoperative complications such as infections and delayed wound healing, it is important to maintain perioperative glycemic control. Due to stress of surgery and reduced food intake, perioperative insulin requirements will most likely differ from usual insulin requirements (4,6).

Despite increased use of CSII, there is limited published literature outlining the appropriate perioperative use of insulin pumps. Recognizing a need to standardize care, this article aims to assist anesthesiologists in caring for patients with CSII therapy in the perioperative period.

This article is based on a review of existing literature and aims to discuss anesthesiologic general decision-making for the perioperative management of CSII. It will explain how the insulin pump works, its benefits and risks for perioperative use and propose recommendations for CSII perioperative management.

Methods

A literature search was conducted in the PubMed database, with the MeSH terms "insulin infusion systems", "diabetes mellitus" and "hyperglycemia". The search was limited to articles published in Portuguese, English and German. The initial search yielded 67 articles that were later selected based on their relevance. Ultimately, 23 articles were addressed.

Insulin Pump: How it works and principles

The insulin pump is a small battery-operated external device containing a refillable insulin reservoir (1,5). Subcutaneous insulin infusion pumps mimics normal physiologic insulin delivery, allowing for convenient subcutaneous insulin administration with enhanced flexibility in dosing and without injections (7). CSII involves a continuous basal infusion of short acting insulin (Novorapid®, Humalog®, Apidra®), in combination with meal-time boluses of the same insulin (5).

Basal insulin infusion is the absolute requirement for a low insulin concentration - even in the fasted state - to maintain euglycemia and prevent ketosis, but a sufficiently low concentration to allow hepatic gluconeogenesis to supply the brain and vital organs (8). The basal rate is programmed to deliver small doses at constant infusion over 24h. It can be temporarily increased/decreased to accommodate fluctuations in blood glucose levels. The hourly infusion rate is tailored-made, according to variables such as insulin sensitivity, the dawn phenomenon and regular daily activity. The basal infusion usually accounts for approximately 50% of the total daily requirement for insulin, although this may vary (8).

Bolus dose of insulin is required to maintain euglycemia and absorb carbohydrate load, being administered at or just before meal time. Following a pre-meal blood test, bolus dose may be subject to correction due to hyperglycemia levels above a predetermined level8. Doses are calculated based on carbohydrates ingested and according to the carbohydrate-to-insulin ratio. This ratio and the insulin-sensitivity factor are calculated from the total daily dose of insulin and thus reflect patient's sensitivity to insulin. Insulin-sensitivity factor provides a unique measure of the extent of decrease of blood glucose with 1 unit of insulin infusion and enables blood sugar correction above a prespecified target, before next meal intake. Both are individualized and preprogrammed into the pump (5,8).

Insulin pump also contains a pre-set memory system which calculates the time and amount of the last insulin dose, therefore allowing to estimate the level of insulin still present. This system aims to prevent excessive or extensive corrections, thus harnessing protection from hypoglycaemia (2,8).

Such a device may be used alongside self-monitored blood glucose or continuous glucose monitors (CGM) which assess subcutaneous interstitial glucose concentrations.

Insulin infusion is performed through a catheter, or directly via a pod. Both the tubing and pod attach to a fine bore subcutaneous plastic or metal cannula (typically replaced every 2-3 days) (5).

Although pumps may be placed in a variety of locations, the abdomen is the most prevalent site among patients (5).

Insulin pump in the perioperative period

Outlining a well-designed plan to maintain glycemic control in surgical patients using CSII is vital to minimize potential risks related to such method of insulin delivery.

There are 2 courses of action available to the healthcare team during perioperative period (3,8):

1. Maintaining CSII during the procedure;
2. Discontinuing CSII during the procedure;
   2.1. Disconnecting patients from their insulin pump and replacement with an intravenous insulin infusion;
   2.2. Discontinue the pump with or without intermittent insulin boluses for blood glucose correction.

The choice of anesthetic technique will impact the effect on glucose homeostasis during surgery. Effects are usually mediated by stimulation or inhibition of hormones such as cortisol and growth hormone, change in sympathetic nervous system tone, and influence on hypothalamic-pituitary-adrenal axis.

The anesthetic technique per se - general anesthesia (GA) or regional anesthesia (RA) - does not present as a decision criterion in favor or against perioperative CSII and, therefore, the method of choice for glycemic control. Yet, GA is associated with increased insulin resistance, glucose intolerance, and postoperative hyperglycemia. In turn, RA has residual effect on metabolism and changes in blood glucose are less common4. Patients using insulin pumps may present increased surgical risk as complications may arise, either from diabetes or other comorbidities. Surgical procedures vary in type (elective, emergent), duration, and time required for anesthesia, as well as the need for prolonged postoperative fasting (9). Therefore, understanding patient comorbidities, together with their cognitive, emotional and physical ability to manage the insulin pump, and the idiosyncrasies of the surgical procedure is imperative to make the decision to continue or discontinue insulin infusions via pump during the perioperative period.

1. Maintaining CSII during the procedure

a) Benefits of maintaining CSII during the procedure:

CSII pumps can be safely used during the perioperative period, provided an established protocol is in place. Generally, pump users are motivated and educated around managing their diabetes. Hence, this option increase patient satisfaction (3,4,10,11,12).

Maintaining CSII will rely on the ability of the patient to safely operate the pump and the familiarity of the healthcare provider with CSII (10).

Retrospective studies have shown no difference in glycemic control and increased patient satisfaction when maintaining CSII, in comparison with patients who switched to another insulin therapy regimen during hospitalisation (3,13). Thus, CSII allows glycemic control comparable to IV insulin infusions(3,14).

Evidence points to benefits in maintaining CSII during surgery in lieu of discontinuing, with decreased fasting glucose on day 1 post-op and more stable blood glucose levels during surgery. Yet, these studies showed ambiguity in design and data collected was not confirmed by other studies (6,13,15).

Studies also showed that hyperglycemia is less frequent when maintaining CSII/IV infusion, when compared with intermittent insulin boluses (3). Other studies indicated that even though mean blood glucose levels remained unchanged in patients who kept CSII compared with those that discontinued, more episodes of severe hyperglycemia and hypoglycemia in patients who discontinued were experienced (14). Increasing evidence strengthens the recommendation to maintain CSII as retrospective studies and case reports have shown that CSII can be maintained safely during perioperative period (10).

In addition, maintaining CSII contributes to reducing risks caused by transition issue to and from another insulin therapy regimen, such as hospital acquired diabetic ketoacidosis, electrolyte and fluid abnormalities, hypoglycemia. Lastly, it also unburdens day surgery with its intrinsic benefits (16).

In short, maintaining CSII may prove beneficial in the following scenarios (3,4,5,10):

1. Elective surgery;
2. Outpatient surgery;
3. Non-cardiac surgery;
4. Noncritically ill patients;
5. Short-term procedures <2h;
6. No postoperative fasting required – suspension of only 1 meal or none at all.

b) Recommendations while maintaining CSII:

Preoperative setting:

- Patient should be subject to endocrinology consultation (3,5);
- Upon admission, perform an HbA1C if none was was not performed in the prior 3 months. Elevated HbA1c is correlated with adverse surgical outcomes (3).
- Patient enquiry concerning their diabetes type, duration and current glucose control. It is also advisable to obtain information on episodes of hypoglycemia (9);
- Upon admission, the presence, duration of use and infusion set location of CSII should be documented (3,10);
- Establish a consistent blood glucose level during a fasting period (days to weeks before surgery) in order to set a baseline rate. If this test is not performed, baseline rate should be temporarily reduced to 80% until patient resumes handling the insulin pump;
- Signed patient consent outlining conditions for CSII use in the hospital (5,14);
- Hospital provider should obtain a detailed record of the pump brand, type of rapid-acting insulin formulation and the pump settings, basal rate, carbohydrate ratio (i.e., grams of carbohydrate for 1U of insulin – amount of insulin needed to counter the amount of carbohydrate in a meal or snack in order to keep the blood glucose at an acceptable level after eating) and the correction or sensitivity factor (3,5,10);
- Patient should provide their own insulin pump supplies (14);
- Request the patient to insert the infusion set outside the surgical field as appropriate (9);
- Ensure subcutaneous CSII cannula is placed away from surgical field and accessible to healthcare team (4,5);
- Patient should use a plastic subcutaneously-inserted cannula, not a steel one;
- Throughout hospital stay, the pump should be inspected regularly by nursing staff with a view to ensure proper functioning (10);
- Infusion site should be inspected for signs of inflammation or leakage. Also, date and time of cannula insertion should be properly documented (5,10);

- Surgery should be scheduled at the first time in the morning, if possible.
- Patient should have a light meal up to 6 hours before surgery.
- CSII should be continued at usual basal rates3. The patient should administer the usual basal and correction insulin until midnight of the night before and should then continue the usual basal infusions overnight (17);
- Measurement of blood glucose should occur every 2 hours until the day of surgery;

Intraoperative setting:

- On surgery day, basal insulin infusion rate should be 80% of the usual rate. Based upon the assumption that the average patient using an insulin pump has a supraphysiological basal rate (5,8).
- During intraoperative period, the anesthesia team must take responsibility for CSII and assess the insulin pump infusion site (8,9,13). Patients undergoing surgical procedures are unable to appropriately self-manage their pump as they often evidence altered levels of consciousness for variable time periods (4).
- Before, during and after the procedure, the healthcare team must inspect the skin insertion site and the connection to the device (13).
- Correct connection and functioning of pump should be monitored (18);
- On an hourly basis at least, the healthcare team must monitor patient's capillary glucose levels. For the majority of critically ill patients and non-critically ill patients, the recommended target glucose range is 140-180 mg/dL (19).
- If glucose levels are not within the acceptable range, bolus correction via the CSII is allowed (10,20):

Blood glucose	Recommendation
<100 mg/dL	Turn off infusion pump. Check every 30 min.
101-140 mg/dL	Decrease basal rate by 25%.
141-180 mg/dL	Maintain basal rate.
181-220 mg/dL	Verify correct functioning of insulin pump. Increase basal rate by 25%.
>220 mg/dL	Verify correct functioning of insulin pump. Increase basal rate by 25-50% and give 2-4U as bolus insulin.
>300 mg/dL	Measure electrolytes and blood ketones. Start IV insulin infusion.

- In the event of uncontrolled hyperglycemia, it may be necessary to disconnect CSII and convert to an insulin infusion (5,13,18). Although software interface varies among pumps, the main basic functions are easily operated on all, with the "stop" or "suspend" basal function being easily engaged (8).
- For all cases, hypoglycemia (<70 mg/dL) or symptoms and signs of hypoglycemia at ≥70 mg/dL should be immediately treated, by means of suspending insulin pump infusion and treating hypoglycemia in accordance with local protocol. Glycemia should be re-checked after 5 minutes (5);

Post-operative setting:

- Correct connection and functioning of pump should be monitored;
- Hourly assessment of glycaemia levels. After the procedure and up until the patient is eating and drinking again and able to manage their own glucose control, capillary blood glucose monitoring should be maintained on a frequent basis (13).
- If possible, patient should initiate liquid diet 1 hour after surgery and initiate solid diet 2 hours post-op (20).
- Postoperatively, and from starting oral intake, prandial boluses should be initiated according to the usual schedule. Intravenous fluids can be discontinued (13,17).
- On first- and second-day post-op, patient should plan to check glycaemia more frequently in order to re-establish baseline status (17).

c) Hazards of maintaining CSII during the procedure:

- **Disconnection of insulin pump:**

  Dislodgement of the catheter from the insulin pump (9,14) may occur inadvertently due to patient movement. Therefore, it is of utmost importance to inspect the pump insertion site and connection before, during and after the procedure.
  Patients on CSII do not take any long-acting insulin. Hence, any interruption of insulin delivery can offset to develop hyperglycemia very quickly, which might lead to ketoacidosis (5). Disconnection, occlusion (kinking of infusion catheter) or cessation of the pump will cause relative insulin deficiency within 1h and absolute insulin deficiency within 4h, causing a severe risk of hyperglycemia and ketosis (8).
  Moreover, excessive sweating that may occur during or after surgery can cause displacement of the subcutaneous needle or catheter (5,8).

- **Malfunctioning of insulin pump:**

  Radiation exposure in intraoperative procedures such as cardiac catheterization, mammography, fluoroscopy, cardiac defibrillation, intra-op X-ray, CT or MRI may cause damage to the pump or prevent correct functioning5,9. Most pump manufacturing companies recommend no radiation exposure (5). Often, the need for intra-op radiation exposure may be anticipated and the pump may be disconnected, removed from the OR, or covered in advance. In the event of exposure to electromagnetic radiation, the pump may be temporarily removed during radiation exposure and stored outside the OR, being connected afterwards. CSII can be safely removed for up to one hour consecutively, without alternative insulin being required. Electrocautery use may increase the risk of pump damage or cause intra-op malfunction9. Electrocautery may cause pump malfunctioning depending on the brand of insulin pump, therefore any guidelines or protocols should account for recommendations provided by manufacturers of the specific pump in use.
  Damage to the CSII caused by heat has been reported, so it is important to take into account the OR conditions and other variables such as the use of heating blankets1. Additionally, since insulin is sensitive to temperature it is advisable to avoid large temperature variations in the OR. Development of diabetic ketoacidosis from exposure of insulin pumps to heat and sunlight have been reported (22).

- **Mismanagement of insulin pump:**

  Healthcare team may not be familiar with CSII and the alarm signals of the insulin pump. Moreover, a healthcare team unfamiliar with CSII may not be able to easily titrate and to counter the glycemic variability that occurs during major surgery (5,16).

2. Discontinuing CSII during the procedure:

Prolonged surgical procedures and opioid administration post-op for pain management may influence the decision to discontinue the insulin pump during the intraoperative period. In case of elective surgery, such variables may be foreseen. Conversion from insulin pump to IV insulin infusion is a preferred option in patients who are scheduled to undergo major/emergent surgery, which may face hemodynamic instability or are critically ill.

In short, discontinuing CSII may prove beneficial in the following scenarios:

1. Emergency surgery (9).
2. Major surgery (5,8): Major surgery triggers large inflammatory response and often results in difficulty controlling glycemia, particularly when glucocorticoids or beta agonists are used in the perioperative setting. On the other hand, minor surgery results in slim or no change in metabolism, and therefore, entails minimal impact on insulin needs.
3. Procedures lasting >2 hours (4,5,10): Long-term procedures are associated with greater surgical stress and a higher risk of perioperative hyperglycemia.
4. Procedures likely to miss more than one meal or cause significant ileus (8): Prolonged postoperative fasting while maintaining basal rate via insulin pump may inevitably lead to postoperative hypoglycemia. Counteracting hypoglycemia with glucose infusions is more expensive and more prone to failure than turning-off CSII with conventional diabetes management.
5. Critically ill patients (5,10): Subcutaneous absorption of insulin is unreliable in hemodynamically unstable patients.
6. Depression of the state of consciousness, confusion or incapacity (5).
7. Surgery requiring electrocautery.
8. MRI, CT scan, X-Ray or any other type of radiation exposure (5).
9. Lack of trained health care providers, diabetes educators or diabetes specialist.

Recommendation while discontinuing CSII:
In the event of pump disconnection, the device should be labeled and stored together with the patient's personal belongings, along with corresponding documenting. The pump together with its tubing may be removed, being only the SC cannula left in place, unless the cannula site is infected or placed in the surgical field. Cut tubing or pump disconnection should be avoided as the remaining insulin in the tube may infuse quickly and risk hypoglycemia.

When compared with sample groups where the insulin pump was maintained or replaced by IV insulin infusions, discontinuation of the insulin pump and administration of intermittent insulin boluses proved to be less effective in preventing hyperglycemia.

Conversion from insulin pump to IV insulin infusion is a preferable option in patients who are scheduled to undergo major/emergent surgery, which may face hemodynamic instability or are critically ill. Concerning patients with poor metabolic control or in critical condition, IV blood glucose correction is advisable as it proved to be faster and more reliable. In these cases, insulin infusions are preferred since absorption and distribution of subcutaneous insulin may be adversely affected.

2.1 Disconnecting patients from their insulin pump and replacement with an intravenous insulin infusion

Transition from CSII to insulin infusion regimen (4,5):

- Start of IV insulin at least 30 min before removing the pump;
- If CSII basal rate <1 unit/h: start IV insulin at 0.5 U/h;
- If CSII basal rate >1 unit/h, start IV insulin at 2/3 of the basal rate. Variability in bioavailability and pharmacokinetics between IV infusion and subcutaneous infusion, fasting status, residual subcutaneous insulin at infusion site of the insulin pump, patient safety, tendency to avoid hypoglycemia, are all in the basis of the rationale for reducing the dose of basal rate.
- In case of hyperglycemia or hypoglycemia, follow insulin intravenous infusion hospital protocol.
- In the recovery room, the patient should continue insulin infusion.

2.2 Discontinue the pump with or without intermittent insulin boluses for blood glucose correction

Transition from CSII to SC insulin regimen:

- The 24-h basal dose of insulin delivered by the pump should be replaced by long-acting basal insulin (glargine, detemir or degludec). The insulin pump should be discontinued at least 2h after the first injection of basal insulin.
- Subcutaneous rapid-acting insulin (aspart, lispro or glulisine) bolus can be administered according to the hospital protocol to maintain perioperative glycemia between 110-180 mg/dL.

Restarting CSII:
After recovery from anesthesia, the restart of the pump may only occur provided that: patient is cognitively alert, physiologically stable, without inotropes and is able to resume to autonomous pump management or at hospital discharge (21,23).

In addition, if transferring from IV insulin infusion, an additional hour is required before discontinuing IV insulin. If transferring from subcutaneous insulin, it may be required to temporarily reduce background insulin infusion rate while long-acting subcutaneous insulin is still active. Start basal rate CSII 12-24 hours after last administration of long-acting SC insulin (20). Mealtime boluses are not given until patient is being kept in a fasting state (17).

Conclusion

Answering the question posed in the title of the article: yes, maintain the insulin pump in the perioperative period is an option. Most healthcare professionals have not seen an insulin pump and most certainly will not be familiar with the wide variety of different pumps. Under such circumstances, the majority of non-specialist staff will most likely discontinue pump therapy in favor of familiar therapies, such as variable rate intravenous insulin infusion or intermittent boluses of subcutaneous insulin.

Thus, hospitals need to develop clear protocols for inpatient and perioperative management of patients on CSII, bring forward initiatives to educate healthcare professionals that are likely to encounter this technology and closely liaise with diabetes team. Education is paramount for all staff involved in the care of patients with insulin pumps.

A protocol can contribute to reduce therapeutic misadventures by clinical personnel which are not familiar with CSII therapy, as well as guide goal-directed glycemic and surgical outcomes4.

Randomized controlled trials are needed to determine whether CSII therapy in the hospital is associated with improved clinical outcomes, when compared with intermittent monitoring and conventional insulin treatment or demonstrates a favorable cost-benefit ratio.

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Remote patient monitoring in ambulatory surgery – a pilot study in twenty healthy volunteers

João Barbosa, Maria Valentim, Mariana Almeida, Vicente Vieira

Abstract

Remote patient monitoring (RPM) allows monitoring of patients both inside and outside healthcare facilities, can enable expedited discharge to their homes and provide early detection of complications as they are still being monitored by healthcare professionals. The Patient Status Engine (PSE) is a wireless RPM that continuously collects physiological data and notifies medical staff when the data is outside the predefined limits for vital signs. The aim of this study was to assess the feasibility of RPM, regarding patient's acceptance, external interference and limitations.

Twenty healthy volunteers were recruited and monitored for the non-invasive blood pressure, pulse oximetry, skin temperature, respiratory rate, heart rate and continuous electrocardiography. The most reliable sensor was the heart monitoring and the least reliable monitoring was the LifeTemp sensor for skin temperature. Most of the patients would be willing to use the PSE for up to two days and most of the volunteers would allow for the data to be transferred to their Hospital records and even would be willing to have a video chat in case of need. The majority of the volunteers would feel safer being monitored after surgery.

To conclude, this study shows that most people are willing to contribute with home monitoring and even feel safer using this technology. RPM's technology will continue to evolve and when used properly can provide a high level of quality data. For selected patients, this technology can be of great help and allow earlier detection of complications in the postoperative period.

Keywords: Ambulatory Surgery, Patient Status Engine, Remote Patient Monitoring, Early Warning Score, Telemonitoring.

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Introduction

Remote patient monitoring (RPM) is defined as the use of technology to monitor patients both inside and outside healthcare facilities. The exponential rise of healthcare technology in clinical settings is leading to the development of reliable monitoring systems. Several studies have demonstrated advantages of using telemonitoring in multiple fields of medicine: follow up of asthma in pneumology (1), heart failure in cardiology (2), hypertension and diabetes in family medicine (3,4). However, there are almost no data on its use in the early postoperative period after surgery.

Postoperative telemonitoring is gaining attention as it can enable expedited safe discharge and may allow early detection of complications. RPM as a support for the ambulatory setting is, more than ever, a close reality that allows patients to leave hospital while still being monitored by healthcare professionals, which can be fundamental in higher risk patients and for more invasive procedures, it may also help those who have no accompanying person at home. The early discharge can be really important, especially at the extremes of age, such as children and the elderly, and psychiatric and neurological diseases.

The Patient Status Engine (PSE) from Isansys® is a wireless remote monitoring system intended for use by healthcare professionals to continuously collect physiological data in home and medical settings (5). Variables that may be collected include heart rate, heart rate variability, ECG-derived respiratory rate, skin temperature, patient positionings and activity, and optionally SpO_2 and non-invasive blood pressure.

The aim of this pilot study was to assess the feasibility of RPM in our population at the patient's usual lifestyle at home, patient's acceptance and to evaluate the effectiveness of the monitoring devices when exposed to the volunteers' daily activities, including external interferences and limitations.

Methods

To carry out this pilot study, twenty healthy volunteers were randomly selected and the following parameters were monitored: non-invasive blood pressure, pulse oximetry, skin temperature, respiratory rate, heart rate and continuous electrocardiography. With these parameters, the Early Warning Score (EWS) was also measured. The EWS is a tool that assignes a numeric value regarding several physiologic parameters (blood pressure, heart rate, pulse oximetry, respiratory rate) to derive a score that is used to identify the early signs of clinical deterioration (6). A score < 4 is considered low risk, a score of 5-6 is considered medium risk and a score > 7 is considered high risk, indicating an increased likelihood of mortality (7) (Table 1).

Table 1 Early Warning Score.

Early Warning Score	
< 4	Low risk
5-6	Medium risk
> 7	High risk

Volunteers were given the PSE that comprises Patient Gateway (an android tablet running Isansys® application) (Figure 1), the Lifetouch Blue sensor (electrocardiographic monitoring), the Lifetemp sensor (temperature monitoring) (Figure 2), the Nonin3150 WristOx (pulse oximetry monitoring) and the blood pressure monitors (Figure 3).

After minimum time for monitoring, volunteers were asked to give feedback through a standardized questionnaire (Table 2).

Figure 1 Patient Gateway.

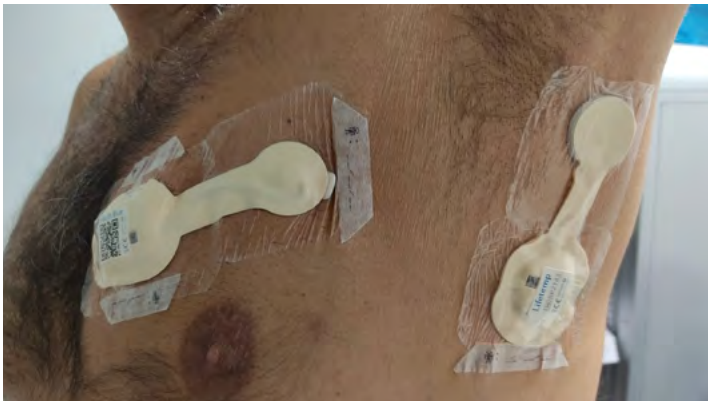

Figure 2 On the left, the Lifetouch Blue sensor (electrocardiographic monitoring). On the right, the Lifetemp Sensor (temperature monitoring).

Figure 3 The Nonin3150 WristOx (pulse oximetry monitoring) and the blood pressure monitors.).

Table 2 Standardized questionnaire given to volunteers after monitoring.

	Questions
1	Did you find it easy to connect and use the devices?
2	Has the use of the device affected your daily life activities?
3	Has the use of the device affected the quality of your sleep?
4	Would you feel safer being discharged on the day of surgery if you were under monitoring?
5	Did you have difficulties with the adhesion of the devices to your skin?
6	Did any of the devices come off during monitoring? If yes, which one?
7	Have you had any allergic reaction to the devices (itching, rash)?
8	Did you have to improve the skin adhesion of the devices (e.g. shaving the area)?
9	What feature of the devices would you change?
10	Do you think the data on the screen should be visible or hidden?
11	How many days would you be willing to use this device?
12	Would you be comfortable with a video call with the medical team?
13	Would you be comfortable sharing photos with the medical team?
14	Would you authorize the recording of your data in your medical chart?

Results

In this study twenty healthy volunteers used RPM, which recorded their vital signs (non-invasive blood pressure, pulse oximetry, skin temperature, respiratory rate, heart rate and continuous electrocardiography) for a mean duration of 15.2 hours. The statistical results of these data are shown in Table 3. The sensor responsible for the heart monitoring was the most reliable in data transfer.

Table 3 Statistical results of vital signs recorded.

	Average	Median	Minimum	Maximum	Standard Deviation
Heart rate	61.25	59.00	44.00	92.00	7.14
Respiratory rate	14.06	14.00	7.00	22.00	2.46
SpO_2	95.65	96.00	94.00	100.00	0.91
Temperature	35.45	35.70	33.20	36.70	0.89
Systolic Blood Pressure	109.61	108.00	91.00	127.00	9.11
Diastolic Blood Pressure	72.09	72.00	62.00	82.00	4.99
Early Warning Score	0.87	0.00	0.00	5.00	1.16

Lifetemp sensor gave unreliable data in 80% of volunteers with an unreal hypothermia of 33°C during its usage.

WristOx, given its easily misplacement during sleep, had, on average, 36 minutes per volunteer without transmitting data during sleep.

The questionnaire was answered by 17 patients (85%). Most volunteers (70%) felt that connecting and using the devices was achieved without great effort. Regarding activities of daily living, 40% of volunteers did not notice any impairment and 20% reported that their activities were significantly affected. 60% of subjects reported no change in sleep quality, and 10% reported significant sleep disturbance from using the devices.

50% of volunteers mentioned difficulty adhering the device to the skin, and in 25% had the temperature sensor come loose. Two subjects had pruritus on the finger of pulse oximetry, one subject had a rash with the electrocardiography monitoring and one subject had pruritus with the electrocardiography monitoring. When asked if they would change anything about the equipment, two subjects mentioned interference with sleep at night from the LED lighting of the devices. When asked if the data collected should be visible to patients on the tablet, 50% answered they would prefer not to have access to the data.

Half of the subjects would be willing to use the device for up to two days and 20% for up to four days. Only two subjects (10%) declared that they would use the device just for one day.

88% of volunteers would agree to video chat with the medical team if needed. 94% would agree to share photos with the medical team if needed. 94% of volunteers would approve the transfer of collected data to the patient computer archive. 94% of subjects revealed that, in a postoperative setting, they would feel safer being submitted to day-case surgery if they were under monitoring after discharge.

Discussion

RPM is a technology that will increasingly be part of clinical practice in the future and will play an important role in the quality of life of patients in the immediate postoperative period on an outpatient basis. Although there are not a lot of studies about the reliability of RPM in the perioperative setting, some studies begin to reveal the potential of RPM in surgeries such as spine surgery (8) and colorectal surgery (9).

Data is transmitted wirelessly from the sensors to the patient gateway and from the patient gateway to a central server where it is stored for analysis. The PSE can notify medical staff when physiological data is outside the predefined limits for vital signs (Early Warning Scores), allowing to quickly and confidently detect deterioration after surgery, enabling early proactive intervention. The valuable data provided by the PSE also gives care teams the confidence to discharge patients sooner, leading to a faster recovery. The unobtrusive wearable sensors allow free movement and avoid bed confinement, which is much more comfortable for patients and allows patients to ambulate (walk), also minimizing risks for deep venous thrombosis. Wireless sensors reduce motion artifacts and overcome data loss due to cable detachment.

The temperature monitoring was feeble, because the device came off many times and we have registered low temperatures in most patients, knowing that it does not correspond to the real body temperature, but to what extent does it make sense to monitor temperature in postoperative patients? Maybe it could be useful in a possible case of infection, but in that case, we would not have a temperature change until probably the 3rd post op day when we would no longer have the patient monitored. It is our opinion that the use of a single sensor for temperature monitoring is not justified, as it does not add such valuable data and increases the cost of telemonitoring immensely.

The pulse oximetry monitoring is probably the most important tool in the postoperative setting, as respiratory depression can be a serious postoperative complication, especially in patients with undiagnosed sleep apnoea. Apart from being reliable and easy to use, the pulse oximetry can have repercussions in daily life activities as it is not very comfortable to use.

Cardiac monitoring provided heart rate data, continuous electrocardiography and blood pressure that was reliable. Cardiovascular complications, such as hypotension, hypertension and dysrhythmias, are very common in the postoperative setting, mainly due to side effects of the drugs used during anesthesia and past cardiac history of the patients such as coronary artery disease and heart failure. Taking this into account, heart monitoring is essential after surgery and overall it was easy to use.

Currently, thanks to the evolution of technology, many patients with hypertension have a home blood pressure measuring device and know how to use it. The blood pressure monitor used in telemonitoring is similar to the ones you can buy at the pharmacy, so they are easy and intuitive to use. However, it implies that the patient actively takes their measurement, so we will have very little data regarding this monitoring if patients are unable or unwilling to actively look for that assessment. Also during the night period when the patient is sleeping there will be no data regarding blood pressure, unless the device is programmable. The ideal would therefore be a wearable monitor that can be used 24 hours a day that would assess blood pressure.

Despite the clear benefits of telemonitoring, there are other data that unfortunately are not yet possible to monitor. Parameters such as pain and postoperative nausea and vomiting would be crucial, since these are the most frequent complications and bring great discomfort to patients (10,11). How could it be accomplished? Our suggestion is to

take advantage of the tablet, with a function that allows the patient to provide their level of pain and postoperative nausea and vomiting on visual scales, through a simple click on the screen.

Interaction with the tablet is also a concern. To what extent are elderly patients or patients with some cognitive deficit able to understand the importance of keeping a tablet for monitoring? The applicability of this type of monitoring is mainly in patients operated on an outpatient basis, and one of the criteria for this surgical regimen is the close surveillance of responsible adult in the first twenty-four hours. Therefore, it can be assumed that the responsible adult will also have access and interact with the tablet.

Another issue that is pertinent to ask is how and when the tablet and reusable devices will be returned to the department. Many strategies can be developed but that will always be a burdensome process.

How can we make technology more wearable? Perhaps in the future we will use the patient's smartwatch, the oximeter into a small, more practical sensor and the blood pressure meter into a wearable device.

What is disposable and what is reusable? In fact, both the oximeter and the blood pressure monitor are reusable, with the main consumable being batteries. At the end of each use, these sensors will be returned together with the tablet, properly sanitized and ready to be used on another patient. The temperature monitoring does not seem to be a crucial sensor in the telemonitoring of the patient, so, from the outset, it is possible to reduce costs. Therefore, the associated costs will be the acquisition of tablets and blood pressure monitors and oximeters, followed by the acquisition of heart and respiratory rate sensors, which are disposable at the end of monitoring each patient.

In what situations does the benefit outweigh the cost? How can investing in this type of equipment be beneficial for an institution? We are witnessing a transformation of conventional surgery into outpatient surgery, in an attempt to reduce hospital costs with hospitalizations. However, certain procedures can make the team uncomfortable as there is no close monitoring of patients postoperatively. Although the 24-hour postdischarge telephone follow-up improves patients satisfaction and is an appropriate tool to address patient's postoperative complaints (12), some reassessment of vital signs is needed to ensure a stable hemodynamic profile. It is in these patients that we believe that telemonitoring will bring more benefits in clinical practice compared to the associated costs.

Conclusion

RPM is not just about more data, but about having enough high-quality data to significantly improve the quality of care. Most of RPM's technologies today, when used properly over a continuous period of time, can provide a much higher level of quality data than previously. The key is to understand the ambulatory situations your patients are in and match them with the appropriate technologies and protocols.

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Pinch and grip strength recovery following ambulatory carpal tunnel release under local anaesthesia

K Kamath, SU Kamath

Abstract

Aim: This study was conducted to compare pinch and grip strength of patients with carpal tunnel syndrome undergoing release to normative values preoperatively and postoperatively.

Methods: Clinical data collected on grip and pinch strength of 50 hands with carpal tunnel syndrome was compared to appropriately matched normative data.

Results: There were definite improvements in strength after 4 weeks of postsurgical release and some subjects continued to have significant deficits compared to the normative data.

Conclusion: Patients with carpal tunnel syndrome have moderate to large weakness in grip and pinch strength in comparison to normative data. Carpal Tunnel Release may reduce this weakness; however, carpal tunnel syndrome patients may often have with residual problems at 4 weeks and may take up to 1 year to resolve completely.

Keywords: Carpal Tunnel Release, Grip Strength, Motor Function, Pinch Strength.

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Introduction

Carpal tunnel syndrome is the most common compression neuropathy of upper limb in practice and is most extensively studied condition (1-3). Carpal tunnel syndrome accounts for approximately 90% of all entrapment neuropathies (2,3). It involves middle aged ladies. In the majority of patients, the exact cause is unknown. Objective assessment of motor function is useful to evaluate outcome after surgical decompression. There appears to be a controversy on which motor function recovery after release (4-7).

Patients with carpal tunnel will have moderate to large weakness in pinch and grip strength in comparison to normative data. Surgery reduces this weakness; however, these patients often will have residual problems at 4 weeks. The aim of our study was to know the motor functional outcome in the form of grip strength and pinch strength changes in idiopathic carpal tunnel syndrome following carpal tunnel release.

Materials and Methods

This prospective cohort study was conducted in 45 consecutive patients who were undergoing carpal tunnel release, between May 2019 and May 2021 after obtaining the institutional ethics committee approval.

The inclusion criteria were all cases between the age of 21 and 60 years who underwent carpal tunnel release surgery following the diagnosis of Carpal Tunnel syndrome by clinical and nerve conduction studies (4,5).

Those patients with history of cervical, shoulder, elbow disorders or history of diagnosed neuromuscular skeletal disorders or post burn contracture or pregnancy or post trauma or carpal tunnel syndrome due to systemic illness were excluded from the study (6,7).

All patients with clinically suspected carpal tunnel syndrome are confirmed by nerve conduction study. Routine and some special investigations are done to rule out the other causes of carpal tunnel syndrome.

Preoperative functional status of hand is measured with questionnaire for disability and Grip and pinch strength (8). Carpal tunnel release was done under local anaesthesia using about 8 to 10 ml of 2% Lignocaine injection.

Grip strength and pinch strength were measured using a handheld Jamar dynamometer, said to be the most accurate for measurement of grip strength. While standardizing, it was set at the second handle position. After the dynamometer was lightly held around the readout dial, the scores were read on the needle side of the red readout marker. For each of the tests, the patients were seated comfortably with their shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position, and wrist between 0° and 30° dorsiflexion and between 0° and 15° ulnar deviation (8-10). Three successive trials were recorded for each test.

To measure pinch strength Jamar dynamometer or Pinch gauge was used.

The recommendations made were:

- Standard position and instruction should be used
- The same test instrument used for preoperative and postoperative testing
- The average of three readings should be used.
- Scores obtained should be compared with age and sex matched formative values
- The dynamometer and pinch gauges should be calibrated and checked regularly

Postoperative functional outcome is measured with questionnaire for disability, grip strength and pinch strength. Patients were followed up after 10 days, 3 months, 6 months and one year.

Results

A total of 50 hands in 45 patients were operated on for carpal tunnel syndrome. All patients in our study were right-handed dominant. In the present study even though 68% of patients presented with bilateral symptoms, it was noted that the right-side symptoms (70 %) were more severe than left. Most of the cases were in the age group of 30 to 50years and right-hand dominance was a universal feature for all the cases included in our series. Bilaterality of disease was observed in 68 % cases. 54 Females were affected more than twice as much as male patients.

Most common symptom was pain (32 patients) in the hand followed by tingling (30 patients), which in turn was followed by weakness (16 patients). Many patients in the study had a combination of two or three symptoms (22 patients). Almost 74 % of the study population had diurnal variation in their symptoms and presented with more symptoms in nighttime with disturbed sleep.

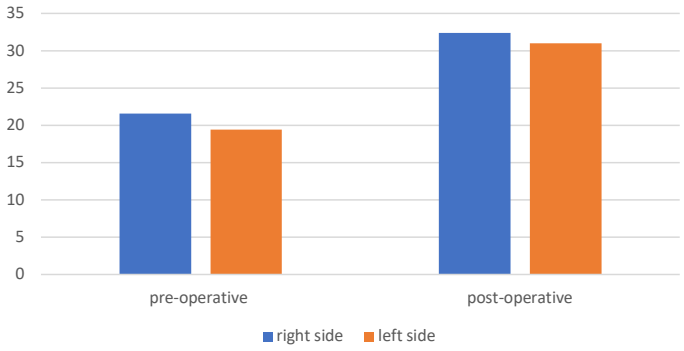
Out of three tests used in our study to diagnose Carpal tunnel syndrome, Phalen's test (n=36) found to be more sensitive compared to other two tests, by Reverse Phalen's (n=30) and lastly by Tinel's sign (n=22).

Most patients in our study were in the severe carpal tunnel syndrome group (56%). In our study, out of 45 patients of carpal tunnel syndrome, 30 patients were operated on right Side 10 patients on left side and 5 patients on both sides. However, 68% of patients had bilateral symptoms and more severely affected hands were operated upon.

Normative value for grip strength was 33.67 and pinch strength was 3.95 measured with elbow at 900 flexion in Indian population (10)

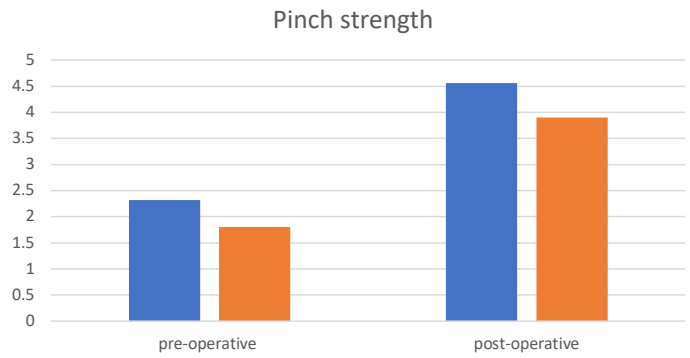
Grip Strength, from an average pre-operative value of 21.55 on the right side & 19.40 on left side, the value increased to 32.37 and 31 respectively [Graph 1}. Progressive trend and hence better outcome in the patients grip strength. The maximum improvement was noted between the 10th postoperative days to 3rd month.

Graph 1



Pinch strength from an average pre-operative value of 2.32 on right side & 1.8 on left side, the value increased to 4.56 & 3.9 respectively [Graph 2]. Progressive trend and hence better outcome in the patients Pinch strength. The maximum improvement was noted between the 10th postoperative days to 3rd month.

Graph 2



Discussion

In a study by Baker et al, patients with carpal tunnel syndrome had moderate to large deficits in grip and pinch strength in comparison with normative data (13). Splinting and stretching may reduce these defects.

In our study it has been found that 72% of patients had both motor and sensory conduction abnormalities. 20% had only pure sensory abnormalities and 10 % had pure motor changes. This is in sharp contrast to western literature where pure sensory abnormality is more common (10-13). Normal Grip Strength measured was 43.5 Kg/m2 on right side and 40.11 Kg/m2 on left side. Females had lesser grip and pinch strengths when compared to male subjects. Our measurements were found to be lesser compared with other studies (14-16). Improvement in parameters considered in this study, were maximum from 3rd week to 3rd month (17,18). However full recovery took almost one year and was based on severity.

There are newer grip systems to measure each finger's grip strength available and they are being used in some parts of the world instead of traditional dynamometers (19).

Study by Gellman et al evaluates the time required for grip and pinch strength to return to preoperative levels after carpal tunnel release. Grip strength was 28% of preoperative level at 3 weeks; 73% by 6 weeks and returned to the preoperative level by 3 months. At 6 months grip strength was found to increase to 116%. Pinch strength returned sooner, being 74% of preoperative level at 3 weeks and 96% by 6 weeks. By 3 months an increase to 108% was seen and at 6 months an increase to 126% of preoperative levels was found (20).

Conclusion

Motor function improvement as assessed by grip strength and pinch strength in this study, were maximum from 3rd week to 3rd month. However full recovery took almost one year based on severity. Significant functional improvement in terms of grip and pinch strengths, following surgical release was observed.

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Management of recurring pilonidal sinus with bilateral subcutaneous overlapped fatty flap compared with rhomboid flap

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Abstract

Background: Pilonidal sinuses have many different methods of management to clinicians in the world. Its diverse clinical appearances requires differing types of intervention, with an optimal technique to manage patient severity and risk of recurrence.

Aim: To attain ideal healing and prevent recurrence after overlapped fatty flap as new technique in pilonidal sinus disease with rhomboid flap.

Patients and methods: all prospective patients admitted to this study were operated in Zagazig University Hospitals, surgical department between February 2020 and July 2022. In total, 50 patients had recurrent pilonidal sinus. We had two groups who underwent either overlapping flap (group A: 25 patients) or rhomboid flap (group B: 25 patients). Operation duration, degree of postoperative pain, hospital time duration, postoperative complications, and recurrence were all evaluated.

Results: Equal duration of operations (60min.) In both groups. According to pain perception was reduced in group A ($p=0.003$). The recurrence rate was also lower in patients who underwent bilateral overlapped flap ($p=0.005$).

Conclusion: wellbeing of overlapped fatty flap than rhomboid flab in recurrent pilonidal sinus.

Keywords: recurrent pilonidal sinus, overlapping flap, rhomboid flap.

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Introduction

The spectrum of pilonidal disease has a variety of clinical presentations from asymptomatic cysts (containing hair) and sinuses to large abscesses of the sacrococcygeal area (1). Pilonidal disease (PD) is relatively common in young healthy hirsute males. We mean pilonidal sinus that occurs in natal cleft causing problem in work. Multiple hair in the sinuses characterize the disease (4-7).

Pilonidal sinus is common problem facing the surgeon because of the risk of recurrence and need careful observation (11-13). We depend in our new technique on Bascom theory to decrease the groove between the glutei so, decrease the power force of suction make the focus infected area more deep by overlapping two subcutaneous fatty layers above it.

According to the acquired Bascom theory local the hair suction occurs due to round glutei and deep groove between them to force the hairs to penetrate the skin and dislodge forming abscess cavity (7). Karydakis asserts that loose hairs from the scalp form the foreign body and abscess [8-12].

The surgical technique preferred must be simple, not associated with complications but associated with short hospital time and rapid healing without recurrence but with rhomboid flap, the recurrence is higher than overlapped fatty flap [7-11]. Many revisions have reported high recurrence with rhomboid flap because the length of natal cleft is not removed and the groove in between is still deep. This leads to abscess recurrence and liquefied sinuses occur [1-4]. Also, letting of another track or any debris assessed by poor hygiene or scratch predisposes for recurrence [9-11]. Patients with pilonidal disease are not debilitated but their lives are compromised by discharge and pain recurrence [8, 9]. We therefore studied the differences between rhomboid flap and double overlapped fatty flap in healing and recurrence rate.

Patients and Methods

This study was done at Zagazig University Hospital, from February 2020 to July 2022. We studied 50 patients of recurrent pilonidal sinus with either overlapping flap (group A: 25 patients) or (group B: 25 patients). With a rhomboid flap.

It was a prospective, analytical, comparative study.

Inclusion criteria:

1. recurrence after operative techniques
2. surgery oriented and patients orients and consented

The exclusion criteria: patients had with no data or not recurrent

An informed consent was taken as recurrence time and rate, operation ,lasting time, postoperative pain sensation, hospital stay time or duration, and any postoperative complications, were detected.

Preoperative care

All patients routinely underwent chest X-Ray, and complete lab profile, an ECG if above 40 years old, and ECHO for patients over 50 years of age.

Operative Procedure

Usually, patients underwent general anesthesia. patients were in prone position with hips strapped away. The skin was prepared by clipper on the operating table. Patients in group A we depend on the operation of overlapped flap subcutaneous fatty flap depend on the theory of depth of the groove suction between gluteal region and also the depth of the focus region (Bascom theory) when we can decrease the groove, we can decrease the suction power of the hair also increasing the two layers above the focus region, we can prevent or decrease the rate of recurrence of pilonidal sinus.

An elliptical skin incision involving septic focus with all diseased tissues was made. After that dissection of subcutaneous fatty layers on both sides to a depth of 5mm leaving good skin thickness (to keep skin

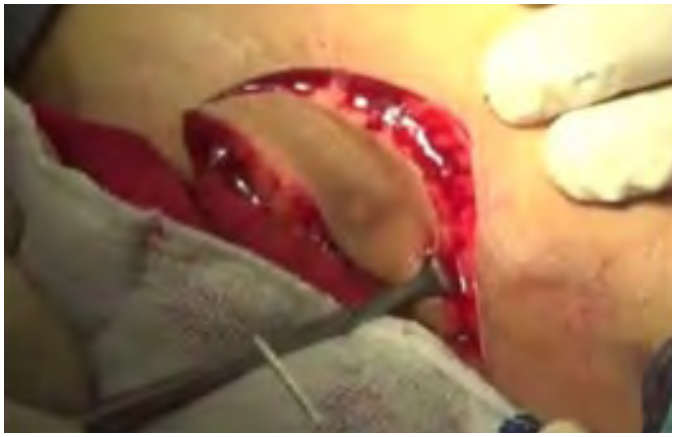


Figure 1. Technique of dissection of both layers lateral and medial overlapping fatty flab in group A.

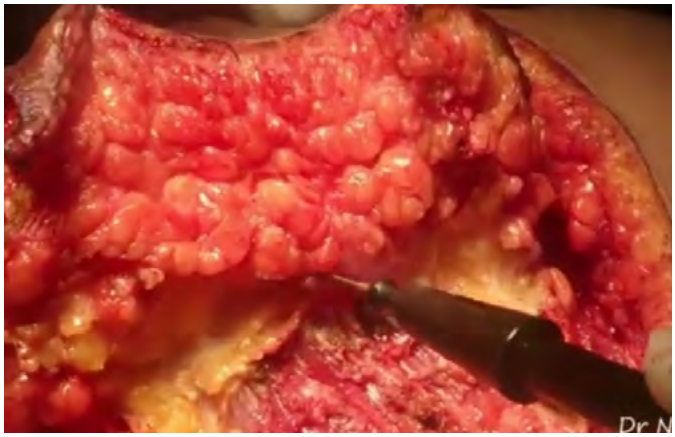


Figure 2. Elliptical skin incision: dissecting the fatty flap.

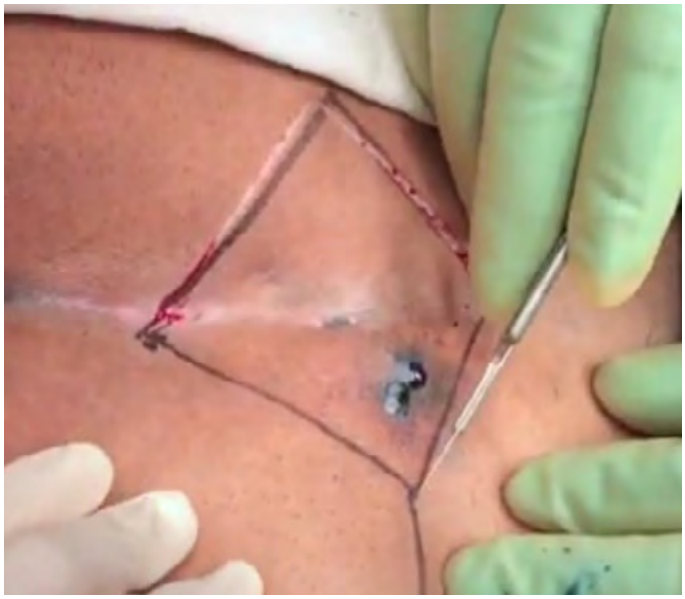
blood supply) and above the muscle sheath, fix one fatty flap under another flap to muscle sheath and the above flap fixed to maximum point depth without any force of traction above another fatty layer to produce double layers of fatty flap above the focus area of infection and decrease groove deepness.

Good hemostasis and washing of the cavity was obtained by saline solution leaving a suction drain. Postoperatively, the dressing daily dressing by normal saline mixed with povidine iodine. The drain was removed after discharge dropped to less than 20 ml /day. Removal of sutures occurred near to 20 days later, with follow-up at 2 weeks, one month and for 3 months, then 18 months.

In group B patients: the same previous preparation but general anesthesia usually started. Skin preparation. Draw rhomboid like the figure away from the edge of the wound. The excision must be taking all focus area, surrounding skin deep to muscles fascia. Closure the wound with edge to edge care not undermine the skin leaving suction drain. postoperative the same group B: the dressing daily dressing by normal saline mixed povidine iodine Drain was removed after discharge dropped to 20 ml per day. Sutures also removed near to 20 days, and follow-up. at 2 weeks, one month and for 3 months then 18 months Patients were advised to maintain good hygiene removal of the hair around usually every 2 weeks, shortening the scalp hair.

Statistical analysis

Data were analyzed using Excel and SPSS, version 16 under mean ± SD for quantitative data. The Student t-test for quantitative data comparring (mean ± SD) . P values less than 0.05 were considered significant. Operative time = from starting of incision to the last suture. Pain score was defined using verbal rating scale (VRS). That will differ according pain self threshold .



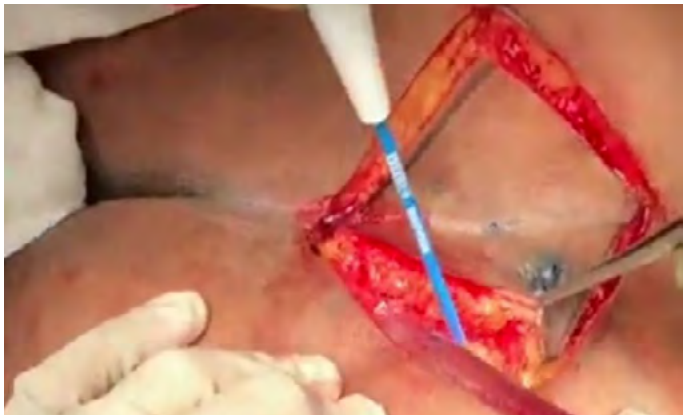


Figure 3. Techniques of rhomboid flap in group B.
Top: drawing the rhomboid flap.
Bottom: Star incision of rhomboid containing infected skin

Results

Table 1 Results.

	Group A	Group B
Patient no.	25	25
Mean age (± SD) /year	25.84 ±6.13	26.04±4.02
Operative time/ min. (mean ± SD)	57±6	56±6
Time of complete healing/day (mean ± SD)	20.08±31.59	22.08±32.99
Inflected wound	3 (6%)	7 (14%)
Recurrence	1(2%)	4 (8%)
Hospital stay	1 day	5 days
Seroma or hematoma	2 cases (4%)	2 cases (4%)

Group A: 25 patients, 15 males and 10 females. Median age was 27.84±6.13 years (range 18-40). In group B, 25 patients, females were 9 and 16 were males with a median age of 29.04±4.02 years (range 19-37). The healing time (mean time) of wound after overlapping flap was (20.13±8.99) days (range 15-60 days). This was near to time of healing of patients of rhomboid flap (mean 22.08±32.99) days, and range (20-65 days). The operative time (mean time) was near in both groups patients 60min. the severity of pain on VRS score was significantly reduced in group A. (p = 0.003) .

Complications in group A in 2 patients (wound infection was 3 cases) and but in group B were 7 patients, p =0.196). The follow up period was 18 months (average 12-24 months). During this period, in group B reported four patients recurrence, whereas in group A only one patient recurrence. Also hospital stay time in group A 1 day But in group B 5 days to follow flap safety and necrosis after 5 days.

Discussion

The ideal technique for pilonidal sinus to prevent recurrence was hard to determine as many techniques have advantages and disadvantages [10-13].

The aim of our work was to prevent recurrences and infection with less healing time, also without pain and short hospital time [3, 4]. rhomboid flap depends on removal of primary focal lesion and flap displacement (full thickness) carrying the risk of flap necrosis then infection and recurrence, with long hospital duration and pain. Also not physiological anatomy so, not cosmetic, not taking of all midline as is controlled by edges length.

Bascom in 1980 stated that pilonidal abscess do not begin in superficial surface of the skin but the infected area is usually deep in the concave groove between gluteal muscles [3-5].

Therefore, the choice of ideal technique is still controversial as many techniques were done but we see the ideal technique had less recurrence, less infection, short hospital time of stay, and little short time pain, subcutaneous overlapping fatty flap (group A) that gives shallow grooving between the glutei subsequent decreasing the suction force with low recurrence one patient 2% and infection 3 patients 6% also it is cosmetic and short hospital time one day case, short time of pain without seroma or hematoma [5].

We recommend to insertion of a suction drain then remove it if, 20 cc per day drained, usually after 15days but in another study published by Erdem et al, suction drains were not inserted [12-14]. Infection rates were 1.5 -7% in other studies before. In our study, it was 3 patients 6 % but with a rhomboid flap, 7 patients 14%. In P-value 0.012 is significant.

In our study the total time of hospitalization in group A (1 day) as compared to those rhomboid (5days);

Our patients had short hospitalization time so there was no risk of flap necrosis or loss, with little pain as the wound is physiologically in midline (no skin displaced like rhomboid) in contrast to patients in group B. But equal operation time (60 min) in both.

Urhan et al, Bozkurt & Tezel had concluded a hospital time was 4.11 days in rhomboid [3-5]. In contrast to our study. Totally our patients group A had complete wounds healing by 20days. But in group B 22 days to be healed near time of healing.

The recurrence rate was observed in group A one patient 2% come after two year by discharge and small abscess that drained by local anesthesia in out clinic.

In group B4 patients 8% , but same in group A with Katsoulis et al, reported by Mentes et al (3.1%) & Akin et al (2.91%)[1,8].

Conclusion

Well-being of overlapped subcutaneous fatty flab excision is near similar to rhomboid flab except in cosmoses, hospital admission duration, length of pain, rate of recurrence and possible flab necrosis but equal healing time and operation time.

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