"A STUDY ON THE ROLE OF NASO-GASTRIC DECOMPRESSION IN PATIENTS UNDERGOING ELECTIVE OPEN ABDOMINAL WALL HERNIA REPAIR WITH MESH"

Dissertation submitted

To

THE TAMILNADU Dr. M. G. R. MEDICAL UNIVERSITY, CHENNAI

With partial fulfilment of the regulations
For the award of the degree of

BRANCH - I M.S (GENERAL SURGERY)

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GOVERNMENT KILPAUK MEDICAL COLLEGE & HOSPITAL

CHENNAI

CERTIFICATE

This is to certify that the dissertation is the bonafide work of

Dr. RAGHUNATH. S. M

On

"A STUDY ON THE ROLE OF NASO-GASTRIC DECOMPRESSION IN PATIENTS UNDERGOING ELECTIVE OPEN ABDOMINAL WALL HERNIA REPAIR WITH MESH"

During his course in M. S. GENERAL SURGERY from

May 2011 to April 2014 at

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"A STUDY ON THE ROLE OF NASO-GASTRIC DECOMPRESSION IN PATIENTS UNDERGOING ELECTIVE OPEN ABDOMINAL WALL HERNIA REPAIR WITH MESH"

is a bonafide and genuine research work carried out by me under the guidance of Prof. Dr. D. Nagarajan, M. S, Professor, Department of General Surgery, Govt. Kilpauk Medical College & Hospital, Chennai - 10.

This dissertation is submitted to THE TAMILNADU Dr. M. G. R. MEDICAL UNIVERSITY, CHENNAI in partial fulfilment of the requirements for the degree of M. S. General Surgery examination to be held in April 2014.

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CONTENTS

INTRODUCTION

ABSTRACT

The value of nasogastric decompression after elective open abdominal wall ventral hernia repair was studied in 60 patients - divided into 2 groups of 30 patients each, belonging to routine & selective nasogastric decompression.

Nasogastric decompression was done as a compulsory measure in routine nasogastric decompression group of patients in the peri-operative period and was continued until there was onset of gastro-intestinal function. In selective nasogastric decompression group of patients, it was not practised as a routine measure, but was instituted only if and when required. This was done as there is general belief that post-operative ileus significantly increases the risk of postoperative complications including nausea, vomiting, aspiration, wound dehiscence and infection due to increased tension along the lines of wound closure, herniation, fascia adhesions, and late bowel function that may lead to a longer hospital stay.

Only one patient in the selective group subsequently required decompression, due to post-operative ileus. Though increased incidence of vomiting in the selective group favoured routine nasogastric decompression, there was statistically significant increase in the complications in the routine group, such as nausea ($p=0.0122$), sore throat ($p=0.0019$) and hiccups ($p=0.0237$). There was also an increase in the mean hospital stay in the post-operative period among the routine group of patients, but this was considered

statistically insignificant (p=0.3852). There was a single case of recurrence among both the group of patients.

Hence, it is concluded that routine use of nasogastric decompression is not advocated and justified, as it serves no special advantages, but at the same time does lead to increased incidence of complications.

Key word:

Nasogastric decompression, routine, selective, post-operative ileus, Mean hospital stay, recurrence

INTRODUCTION

Ventral wall hernias are one of the most common problems encountered by the surgeons in their practise. In our institution, the incidence of ventral hernia repair performed was about 14 %, among all major surgeries performed, being next only to groin hernias, which formed about 24 %.

A ventral wall hernia is defined as an intermittent or continuous protrusion of abdominal organs through a defect in the abdominal wall, with a superficial covering. In the case of an incisional hernia, which is otherwise called a post-operative ventral hernia, an abdominal wall defect develops in the region of the scar of a wound in the abdominal wall, which was inflicted during previous surgery. If there is no superficial covering, then the condition is termed as exstrophy or burst abdomen, depending upon the congenital or acquired varieties.

Once diagnosed, the hernia is only going to increase in size, causing more symptoms and problems for the patients, and hence, surgery is the only solution for the management of the condition. Every effort must be made to reduce the incidence of the recurrence of the condition, thereby preventing another dreadful experience of going under the knife for the patient as well as the need for re-operating on the same patient for the same condition, for the surgeon.

Sir Cecil Wakeley [1] said:

"A surgeon can do more for the community by operating on hernia cases and seeing that his recurrence rate is low than he can by operating on cases of malignant disease."

There have been changes in the surgical management of the ventral wall hernias, starting from the primary suture repair, open repair of the hernia with prosthetic mesh and the latest, laparoscopic ventral hernia repair. But open repair of the hernia with prosthetic mesh has been the standard all these years. Several modifications have evolved on the above three principles of management. But, none have completely abolished the recurrence of the ventral hernias or have brought down the incidence of recurrence of ventral hernia absolutely to zero.

Several interventions have been tried in the pre-operative, intra-operative and in the immediate post-operative period to reduce the incidence of recurrence. For e.g.: reducing the weight or correction of obesity during the pre-operative period, usage of mesh and non-absorbable sutures and avoidance of tension along the lines of closure of fascial planes, etc. during the intra-operative period and prevention of infection, straining and weight bearing during the post-operative period.

One such intervention is prevention of abdominal distension during the immediate post-operative period. For prevention of the abdominal distension, nasogastric decompression has been used as a routine, compulsory measure during the intra-operative as well as in the immediate post-operative period.

Since there is a general belief that post-operative ileus significantly increases the risk of postoperative complications including nausea, vomiting, aspiration, wound dehiscence and infection due to increased tension along the lines of closure, herniation, fascia adhesions, and late onset of bowel function that may lead to a longer hospital stay, nasogastric intubation prior to and/or following abdominal wall hernia repair, as a prophylactic measure for the prevention of the abdominal distension and its associated complications, has been the routine practice of many surgeons and also has been the standard of care in most surgical centres [2,3]. But its usefulness is under scrutiny and the reality is otherwise.

Recent studies have showed that routine use of the nasogastric tube after surgical operations is unnecessary, increases patient's stress and discomfort & have also questioned its efficacy in gastrointestinal surgeries [4-6]. Studies have also demonstrated that the avoidance of its routine use leads to a shorter length of hospital stay [7].

AIM OF THE STUDY

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The aim of the study is to find out, whether routine nasogastric decompression is essential or useful in patients undergoing elective, open abdominal wall hernia repair with mesh:

1) by studying the effects on postoperative gastrointestinal function and wound healing,

2) duration of hospital stay,

3) along with it, any recurrence,

4) whether abdominal distension occurring in the post-operative period, in the form of post-operative ileus in the absence of nasogastric decompression, as is thought of, has a say in the wound healing and subsequently, the recurrence of the hernia in an indirect way,

5) the effects and benefits, if any, of early oral feeding after the open hernia repair, which involves with it, at least a minimum of removal of adhesions of the contents with the sac to the full range of thorough laparotomy in many cases, including any intra-abdominal procedure,

6) to study the characteristics of the patients with ventral hernia,

7) finally, to arrive at a conclusion, whether nasogastric decompression really matters in the management of ventral hernia.

Intended purpose of nasogastric decompression:

1) Hasten the return of bowel function,
2) Prevent pulmonary complications, by diminishing the risk of aspiration of gastric contents,
3) Increase patient comfort, by decreasing abdominal distension and
4) Shorten hospital stay.

The aim of the study is also to disprove that the above purposes could not be achieved by naso-gastric decompression.

MATERIALS AND METHODS

MATERIALS AND METHODS

The study is based on the analysis in 60 patients, who underwent elective, open abdominal wall hernia repair with mesh, from April 2013 to December 2013, at Government Kilpauk Medical College & Hospital, Chennai - 10.

All patients were admitted through the out-patient department in the surgical wards with the diagnosis of ventral hernia. The epidemiological and clinical data of all the patients were noted at the time of admission.

Routine investigations were done for all the patients. All patients were evaluated for the presence of any systemic disease or other precipitating causes. Patients who had systemic hypertension, diabetes mellitus or cough were controlled pre-operatively. The patients were randomly divided into the following 2 groups. The patients were selected after screening with a strict inclusion and exclusion criteria.

After getting the patient assessed, informed consent was obtained from the patients, a day prior to surgery, after explaining all possible effects and complications of the two interventions during the surgery. All patients were prepared for surgery and given a pre-operative antibiotic, which was continued post-operatively for three days. Prior to

shifting to the theatre, naso-gastric (Ryle's) tube was inserted in patients belonging to the routine naso-gastric decompression group. The procedure was done under general, epidural or spinal anaesthesia in supine position.

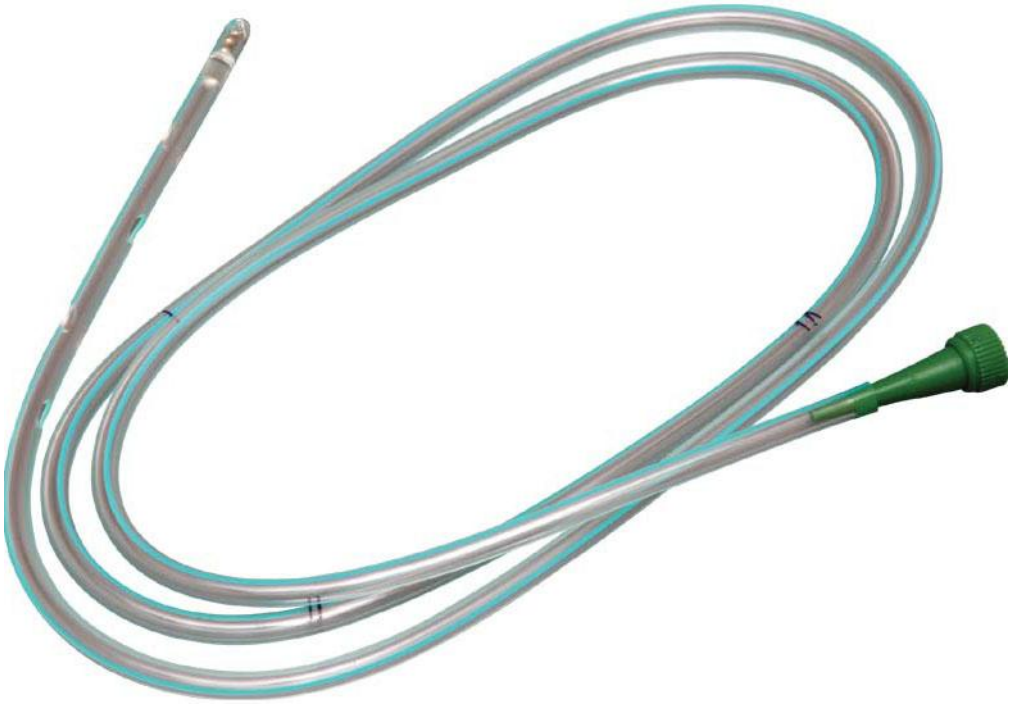


Fig 1: Commonly used naso-gastric tube

In all cases, appropriate incision was made to permit exposure of the hernial sac and the defect. The sac was opened and contents were reduced after lysis of the adhesions. Any intra-abdominal procedure required was done such as adhesiolysis, omentectomy and exploration, if necessary. The excess sac was excised and the defect closed with non-absorbable suture. Then a prosthetic mesh made of polypropylene was placed as an on-lay technique and fixed using interrupted non-absorbable sutures. A suction drain was kept over this layer and brought

out through separate wounds. After closing subcutaneous layers with interrupted absorbable sutures, skin was closed using mattress polyethylene. A sterile compressive dressing was done.

The patients belonging to the selective decompression group were started on sips of liquids on the evening of surgery, after 6 hours, followed by soft solid diet, if tolerated. The patients were gradually resumed on normal diet and mobilised from the first post-operative day itself. If the patient developed post-operative ileus, as evidenced by abdominal distension, vomiting and delay in onset of gastrointestinal function, then, naso-gastric decompression was advocated.

The naso-gastric tube in the patients belonging to the routine decompression group was removed only after resumption of the gastro-intestinal activity in the form of onset of bowel sound or passage of flatus. Then the patient was started on oral feeds gradually, starting from sips of liquids.

Post-operatively, in both the groups, thrombo-prophylaxis was administered based on risk stratification. Adequate analgesia was administered for all the patients with parenteral or epidural Tramadol. Patients in the routine naso-gastric decompression were administered intra venous fluids, until they were started on oral diet after resumption of gastro-intestinal activity.

The suction drain was removed once the drainage was less than 30 ml. Any post-operative complication was dealt appropriately. The skin sutures were removed on the eighth post-operative day and the patient was discharged with the advice to avoid straining and carrying heavy weights and to wear abdominal belt. The required information and data were entered as needed based on the protocol prepared.

Patients were reviewed at two weeks, one month, three months, and at 6 months, for a few cases. At discharge and review, symptoms were asked for and examined for any recurrence.

The cases were analysed then and results compared with existing literature. The data obtained was interpreted using SPSS software in Microsoft Excel and student-t test & fisher test to know the significance.

Inclusion criteria:

1. Patients > 12 years of age.
2. Patients of both sexes.
3. Patients with ventral wall hernia, which includes incisional hernias, umbilical hernias, para-umbilical hernias, epigastric hernias.
4. Patients who are willing to give informed written consent for ventral wall hernia repair with mesh.

5. Patients who are willing to give informed written consent for basic investigations.

6. Patients those who are willing for follow-up for the subsequent six months.

7. Finally, patients who are willing to be included in the study after informed written consent.

Exclusion criteria:

1. Hernia associated with obstruction and strangulation.

2. Obese patients with BMI more than 30.

3. Known COPD patients & patients with compromise of respiratory reserve.

4. Past H/O of TB.

5. Other co-morbid illness – uncontrolled SHT, CAD, CRF, etc.

Study design:

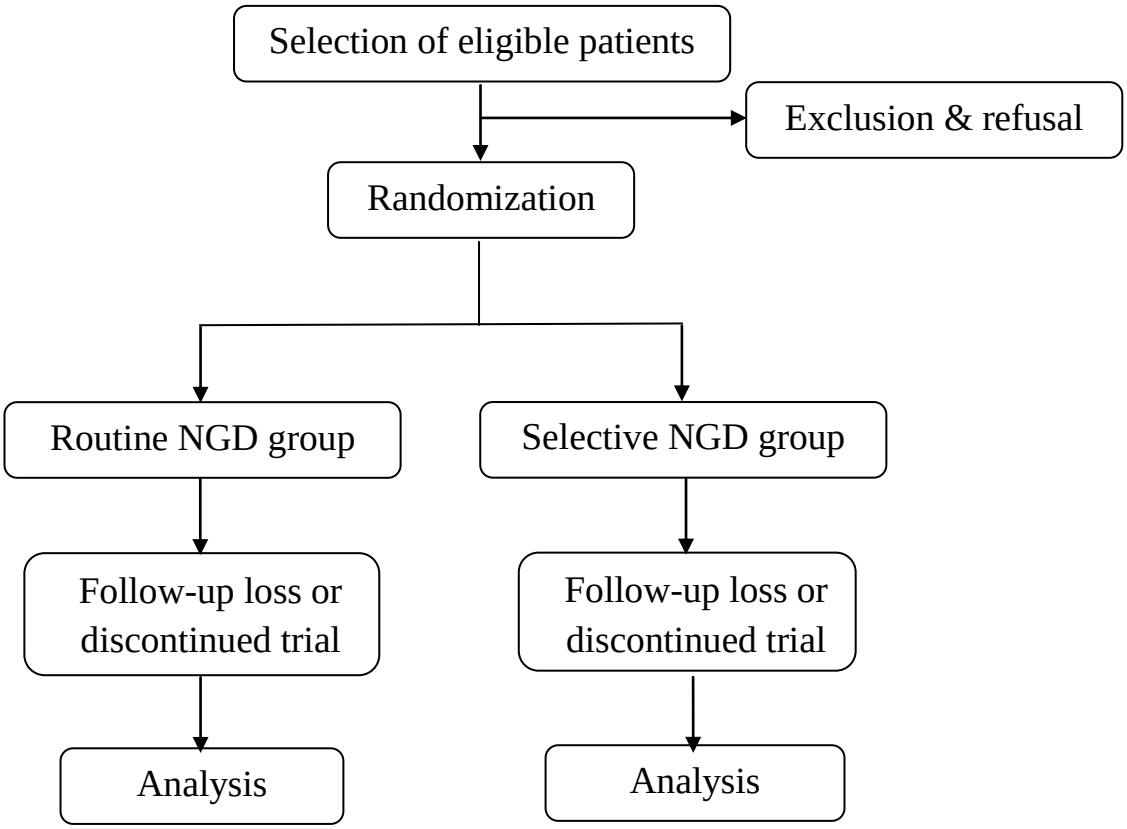
The study is performed by comparing the effects of routine nasogastric decompression and selective nasogastric decompression in patients undergoing elective open abdominal wall hernia repair with mesh.

Routine nasogastric decompression (R-NGD) is defined as nasogastric decompression beginning preoperatively or intra-operatively

and continued until an unspecified point in the patient's post-operative course (i.e., return of bowel sounds, passage of flatus, decrease in nasogastric output, etc.).

Selective nasogastric decompression (S-NGD) is defined as either no nasogastric decompression or intraoperative decompression that will be discontinued in the operating or recovery room and rarely re-instituted only if the patient develops a clinical need for decompression in the postoperative period.

Flow chart: (Showing Enrolment, Allocation, Follow-up, Analysis)



{NGD - Naso-Gastric Decompression}

REVIEW OF LITERATURE

ANATOMY OF THE ABDOMINAL WALL

ANATOMY OF THE ABDOMINAL WALL

Sir Astley Paston Cooper said [8]:

"No disease of the human body, belonging to the province of the surgeon, requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than Hernia in all its varieties."

Thus, for a surgical repair of a hernia, or for that matter, in any other surgery, knowledge of anatomy is essential. The abdomen forms the portion of the trunk between the thorax and the pelvis. The anterior abdominal wall comprises of the following layers, namely, from outside:

1. Skin
2. Superficial fascia - comprising of superficial fatty camper's fascia and the deep membranous scarpa's fascia.
3. Muscles - 4 in all
4. Transversalis fascia
5. Extraperitoneal connective tissue
6. Parietal peritoneum

Scarpa's fascia has no intrinsic strength for hernia repair, but is valuable as it provides another layer of protection for the underlying hernia repair, especially when mesh is used. This fascia continues as the fascia lata of thigh and colle's fascia. The blood supply to the superficial

layers is derived from superficial epigastric artery, a branch of femoral artery, inferior epigastric and deep circumflex iliac arteries, branches of the external iliac artery and superior epigastric artery, the terminal branch of the internal thoracic artery.

The venous drainage follows a simple pattern in which the superficial veins above the umbilicus drain into the superior vena cava by way of internal mammary, intercostal and long thoracic veins. Below the umbilicus, the veins drain by way of superficial epigastric, circumflex iliac and pudendal veins, which converge toward the saphenous opening in the groin to enter the saphenous opening and become a tributary of the inferior vena cava.

The lymphatic supply also has a similar pattern to that of venous drainage. The region of the abdominal wall above and below the umbilicus drains into the axillary and superficial inguinal lymph nodes, respectively.

The cutaneous innervation is supplied by the anterior and lateral cutaneous branches of the ventral rami of the 7^{th} to 12^{th} intercostal nerves, the subcostal and iliohypogastric nerves (L1). The nerves are arranged in a serial order: T7 near the xiphoid process, T10 at the level of umbilicus and iliohypogastric nerve (L1), 2.5 cm above the superficial inguinal ring, and others at proportionate distances between them. There

is poor communication between the nerves as they run towards the midline. This knowledge allows us to use transverse incisions through the rectus to gain access to abdominal contents, which will be safer than midline laparotomy incisions.

Much of the strength of the abdominal wall comes from the four paired muscles and their respective aponeuroses, which form the rectus sheath. From most superficial to deep, external oblique forms the first layer, arises from the lower 8 ribs, runs downward, forwards and medially and gets inserted into the anterior two-thirds of the outer lip of the iliac crest, apart from forming a broad aponeurosis, which contributes to the anterior layer of rectus sheath. It also forms the inguinal ligament.

The internal oblique arises from the anterior two-thirds of the iliac crest and lateral half of the inguinal ligament, and runs at right angles to the external oblique, to get inserted into the lower three or four ribs, apart from forming an aponeurosis, which divides into anterior and posterior layers. The anterior and posterior layers join the external oblique and the transversus abdominis, respectively, to form the anterior and posterior layer of the rectus sheath, above the arcuate line of Douglas, and below which, the rectus sheath is formed by all the 4 layers of the superficial three muscles.

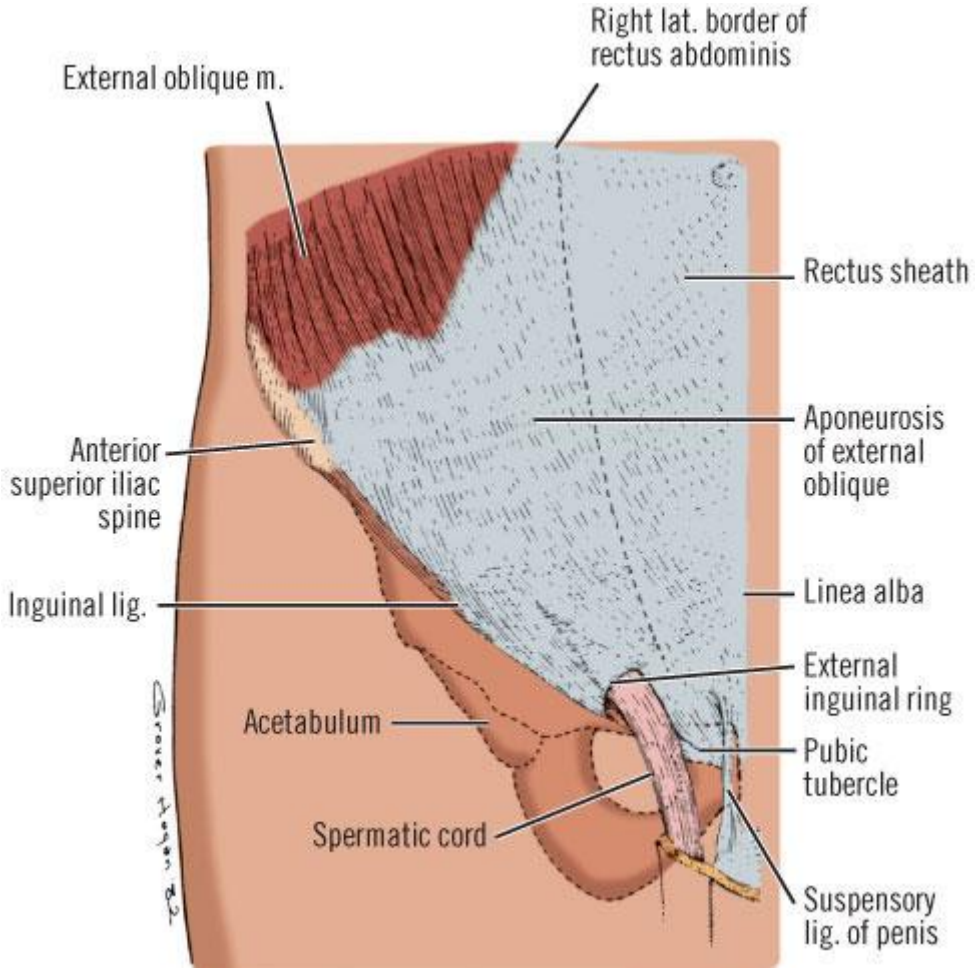


Fig 2: External oblique aponeurosis attachments

The third muscle is the transversus abdominis, which arises from the lower six costal cartilages, iliac crest and the lateral third of the inguinal ligament to get inserted into the xiphoid process, pubic crest and pectin pubis. The contribution of the transversus abdominis in the formation of rectus sheath has been described above.

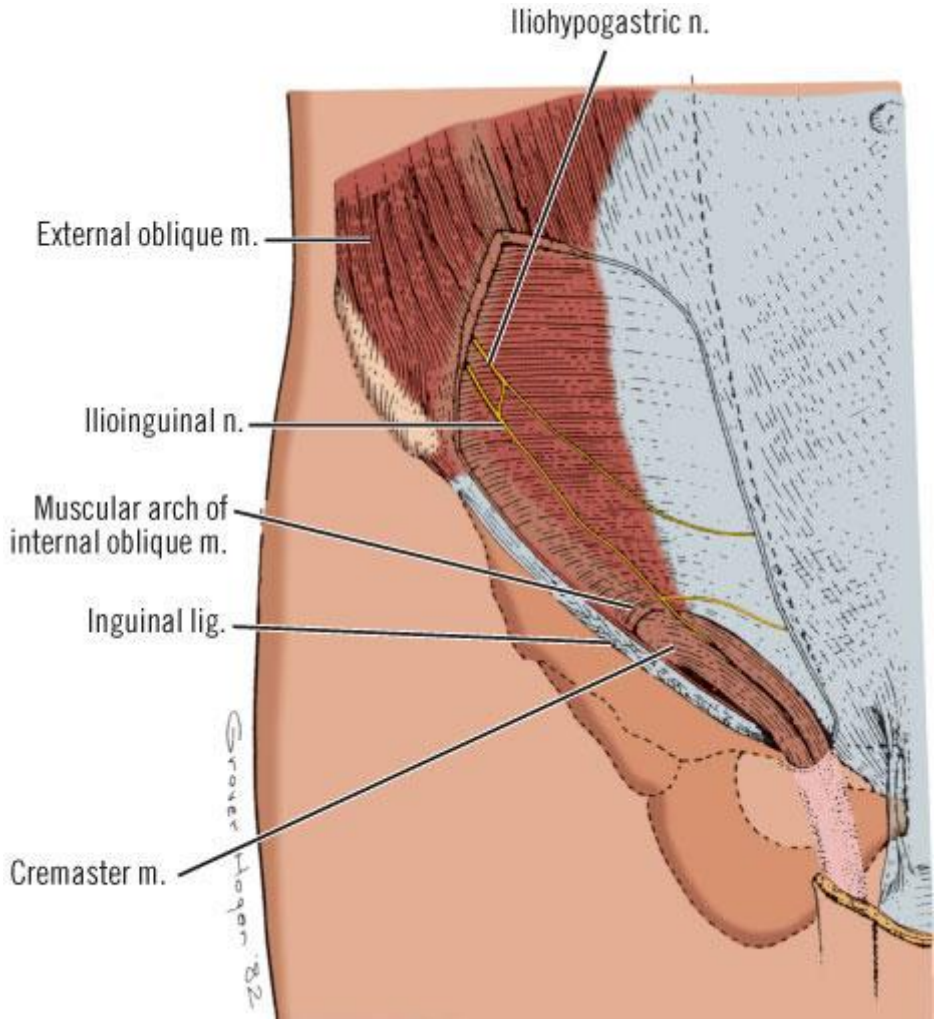


Fig 3: Internal oblique muscle attachments

The fourth muscle, rectus abdominis arises from the pubic crest and anterior pubic ligament, runs vertically upwards and gets inserted along a line joining the xiphoid process and the 7^{th}, 6^{th} and 5^{th} costal cartilages. There are 3 tendinous insertions, which represents attachment of the muscle with the anterior layer of the rectus sheath. The innervation for the muscles arises from the lower 6 thoracic and first lumbar nerves.

The linea alba is a band of dense, crisscrossed, avascular layer of fibers of the aponeuroses of the broad abdominal muscles that extends from the xiphoid to the pubic symphysis. It is much wider above the umbilicus than below, thus facilitating the placement of surgical incisions in the midline without entering the right or left rectus sheath.

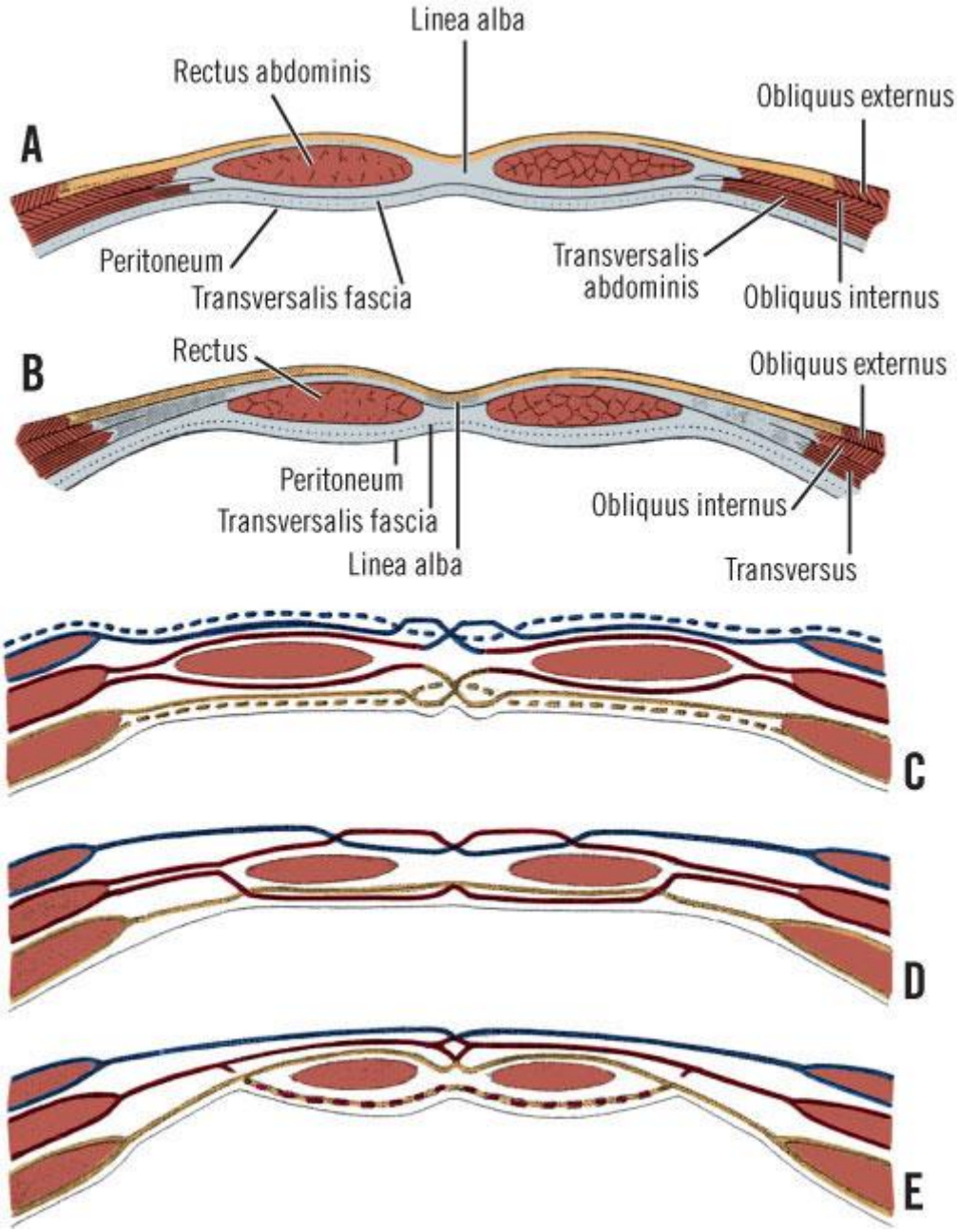


Fig 4: Formation of rectus sheath

VENTRAL WALL HERNIA

VENTRAL WALL HERNIA

Ventral wall hernias are divided into two classes:

1) Spontaneous - Spontaneous hernias occurring in the midline are called median ventral such as:

- Umbilical hernia
- Para-umbilical hernia
- Epigastric hernia
- Diastasis of recti

Those occurring in the anterior abdominal wall lateral to the median line are called lateral ventral hernias such as:

- Spigelian hernias along linea semilunaris or spigelian line
- Hernias through the linea transversalis or sheath of the rectus muscle

2) Incisional - also called as post-operative ventral hernias.

PATHOPHYSIOLOGY OF VENTRAL HERNIA

PATHOPHYSIOLOGY OF VENTRAL HERNIA

The pathophysiology of ventral hernias can be dealt under separate headings of the types of hernia.

INCISIONAL (POST-OPERATIVE) HERNIA:

According to Ian Aird [9]:

"*Incisional hernia is a diffuse extrusion of peritoneum and abdominal contents through a weak scar after an operation or accidental wound.*"

An incisional hernia is defined as a protrusion of abdominal viscera through the site of a previous operative wound. One that occurs in the anterior abdominal wall is, therefore, considered a variety of ventral hernia. Incisional hernia is a frequent and serious complication of abdominal surgery, with an incidence of 2-20% [10].

An incisional hernia may occur in any abdominal wound. Incisional hernia occur most commonly when the muscle and fascia have been insecurely closed, when wounds have been infected and drained, or when the nerves supplying the muscles in the region of the incision have been severed. Incisional hernias frequently follow after dehiscence of a wound. Other causes of separation of the wound edges with hernial formation in the future include hematoma in the wound, marked

postoperative abdominal distension, increased intra-abdominal pressure caused by ascites, intra-abdominal tumour, and severe postoperative cough. Obesity aggravates all these causes.

Incisional hernia incidence is less common when wounds are closed with non-absorbable sutures, such as polypropylene, than in wounds closed with absorbable material, such as poly-glycolic acid or catgut. They usually present within 6 months but can also present several years later.

Once an incisional hernia appears, it tends to increase in size. If left untreated, it may attain a huge size and often contain a large part of the omentum and intestines. A sac is always present, the contents of which usually are adherent to the inner lining. The sac often is loculated. Irreducibility is frequent, and partial obstruction is common. Strangulation is less common because the defect is usually larger than that in other forms of hernia, but intra-saccular strangulation may occur due to adhesions.

INCISIONAL HERNIA DEVELOPMENT:

When a laparotomy is performed, the abdomen is incised to gain entry into the peritoneum for exploration of the contents. At the end of the surgery, the incised abdominal wound is closed in layers, by suturing

the edges of the fascia together, and the skin is subsequently closed over it. The defect in the abdominal wall occurs due to early partial separation of the abdominal wound edges, which results in collagen bridging during wound healing complicated [11]. This separation occurs because of the factors mentioned below.

When the defect is very much, the skin would not have healed sufficiently, and the abdominal organs may protrude through the open wound. This is called as ‘burst abdomen’ or ‘platzbauch’, which requires an emergency surgery.

However, often, the skin remains intact, because of the smaller size of the defect and this defect goes unnoticed initially. Later, this gradually increases in size and manifests, what is called as an ‘incisional hernia’.

RISK FACTORS:

In general, there are 3 groups of risk factors, which facilitate the incisional hernia formation:

1) Factors associated with impaired wound healing:

These factors are present before the operation and are amenable to intervention.

*) Age - Elderly age is associated with atrophy of the abdominal wall and changes in connective tissue.

*) Diabetes, with associated atherosclerosis [12]

*) Smoking [13]

*) Multiple laparotomies [13] - incisions through previous scars result in slow wound healing.

*) Wound infection - tissue breakdown and necrosis following wound infection may severely impede wound healing.

*) Connective tissue disorders - results in deterioration of connective tissues and decrease in the tensile strength of the scar tissues.

*) Corticosteroids usage - particularly in pulmonary disease patients.

*) Others - Malnutrition, radiotherapy, cancers.

2) Factors associated with increased abdominal pressure:

Raised abdominal pressure causes an increase in the strain and tension on the abdominal wall scar, which results in failure of wound healing and subsequently, in hernia formation. A significant increase in incidence of incisional hernia formation has been reported in patients with pulmonary disease, obesity and post-operative ileus, in several

studies. Conditions which cause an increase in the abdominal pressure are:

*) Chronic obstructive pulmonary disease [14]

*) Obesity [15]

*) Ascites

*) Prostatism

*) Constipation

*) Multiple pregnancies

*) Post-operative ileus [16]

*) Severe straining at work

*) Difficulty with micturition

3) Factors associated with surgical technique and peri-operative care:

Surgical factors play an important role in the development of incisional hernia. They are:

*) Type of incision – Incisions such as lateral paramedian and transverse incisions have a less chance of developing an incisional hernia, than a

midline incision, because of the anatomical structures cut by the incision and the pulling force of the abdominal muscles, which is mainly transverse. This means that the transverse wound edges are better likely to get approximated, while wound edges in vertical incisions are likely to get separated [14].

*) Suture technique – Suture length to wound length ratio [17] should be maintained at 4:1. The length of the bite should be at least 1 cm.

*) Suture materials – As the tensile strength of the wound reaches 50% at 4 weeks after an operation and 80% at 6-12 months, suture materials should retain their tensile strength for at least 6 weeks, so as to allow the wound to regain sufficient tensile strength [11]. Non-absorbable suture materials, such as polypropylene and slowly absorbable materials, such as polydioxanone perform equally, but better than absorbable materials, such as polyglyconate [18]. Mulifilamented suture materials such as silk should not be used, as they predispose to increased risk of infection.

*) Prevention of wound infection by using sterile aseptic techniques, prophylactic antibiotics, atraumatic surgical techniques and achieving meticulous hemostasis.

It has been proposed that an early development of incisional hernia is most probably due to the peri-operative factors, such as suture

Fig 5: Incisional hernia from a previously infected wound, as evidenced by ragged scar

technique, wound infection, [19-21] etc. Whereas, a late development of an incisional hernia is probably due to other, largely unknown mechanisms such as connective tissue disorders. In them, a well healed wound in the immediate post-operative period may weaken, over the course of years and may lead to incisional hernia.

This knowledge is used in the management strategy of incisional hernia. If late development implies incisional hernia to a systemic disorder, inherent to surgery in the elderly, diabetics or connective tissue disorder patients, then there is little, a surgeon could do to prevent the incisional hernia formation or its recurrence following its repair. On the

other hand, if incisional hernia has occurred in the immediate post-operative period, then this is probably due to peri-operative factors, which could be prevented or corrected by surgical training or following treatment protocols.

INCISIONS AND INCISIONAL HERNIA:

The midline incision is preferred by many surgeons for performing a laparotomy, be it elective or emergency, because of its ease, rapidity and excellent exposure of both the supra-colic and the infra-colic compartments, including the retroperitoneum. But it has its own disadvantages.

The midline incision is associated with increased post-operative pain, when compared with that of a transverse or oblique incision. Other post-operative complications were also found to be lower with the transverse incisions [22], as advocated by Pfannensteil, Rees, Thompson and others. It is also associated with a higher incidence of incisional hernias, because of the following reasons:

*) Contraction of the abdominal muscles causes the wound edges to get retracted in a midline incision.

*) Midline incision along the linea alba is associated with avascularity, which might impair wound healing.

*) A vertical incision, as in a midline incision, cuts the lineal alba, which are continuous with the abdominal wall aponeurosis, perpendicularly.

Several studies have showed a significant reduction of incisional hernias with a transverse or a lateral paramedian incision [23]. Although, both these incisions take more time to perform, transverse incision is mostly preferred for small unilateral operations [24], while the lateral paramedian incision is mostly preferred for major elective laparotomies [25, 26]. The midline incision is mostly limited to emergency and exploratory surgery, where unlimited access to the entire abdominal cavity is useful or necessary [27].

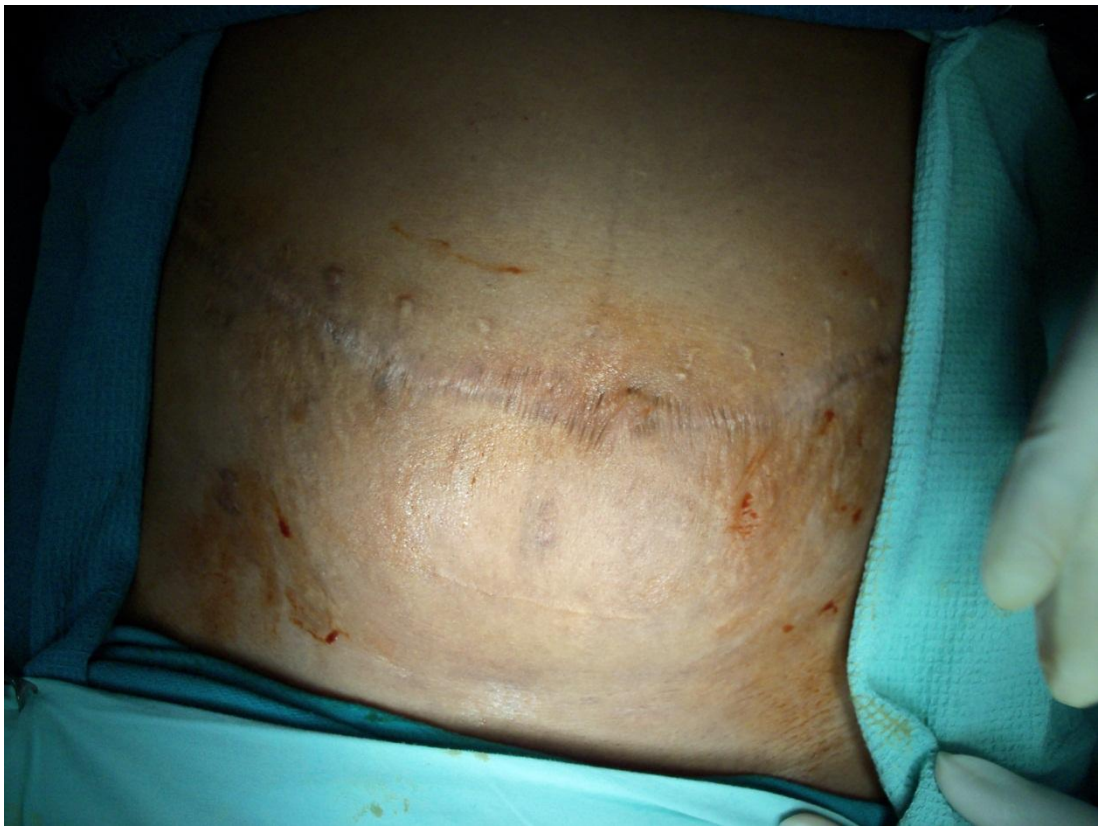


Fig 6: POSTOPERATIVE INCISIONAL HERNIA

UMBILICAL HERNIA:

An umbilical hernia occurs through a circular defect at the umbilical cicatrix, and results in a symmetrical protrusion of the umbilical skin. The development of umbilical hernia can be understood from the embryology of the abdominal wall.

The umbilicus has the obliterated vessels, vitello-intestinal tract and the urachus in its lower part and is reinforced and protected from the preperitoneal fat and viscera. But, the upper part is thin transversalis fascia only, through which segments of preperitoneal fat and viscera can be extruded, leading to umbilical hernia formation.

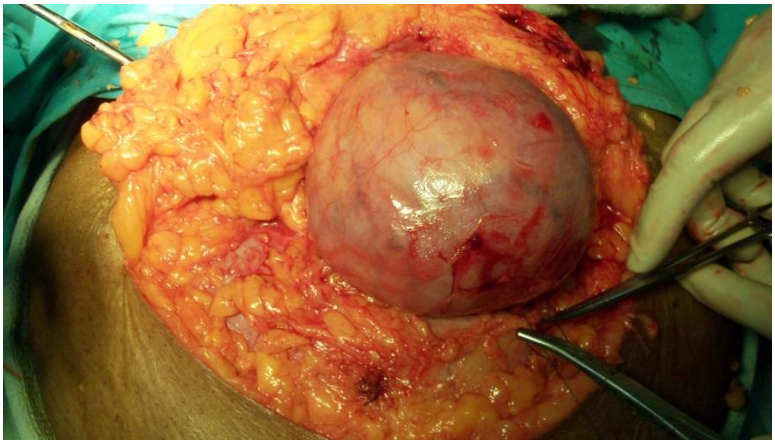


Fig 7: Sac in a huge umbilical hernia

The fascial margins around the umbilical defect are formed by the third week of gestation, and the umbilical cord begins appears in the fifth week of gestation. In the sixth week, as the intestine outgrowths the size of the abdominal cavity, the intestinal tract migrates through the umbilicus, outside the coelomic cavity.

On undergoing rotation of the midgut, the intestinal tract then returns to the abdominal cavity through the umbilical ring at the tenth week of gestation, and subsequent to this, the four folds of the somatopleure begin to fuse inward. This, in turn, forms the tight umbilical defect which allows only the passage of the umbilical vessels.

At birth, when the umbilical cord is manually ligated, thrombosis of the umbilical vessels occurs and the umbilical aperture closes. Any defect in the above process of umbilical closure results in an umbilical hernia, through which omentum or bowel can herniate.

These herniae are common in women, and particularly appear between the ages of 25 to 40 years. The common etiological factors include recurrent pregnancy, obesity and ascites. The sac in umbilical hernia always contain omentum and other abdominal viscera, which often become adherent to the sac wall. The sac is covered by the stretched and weakened linea alba, superficial fascia, subcutaneous tissue and skin.

PARA-UMBILICAL HERNIA:

Para-umbilical herniae are common in multi-parous, obese, middle-aged and elderly women. These herniae occur most frequently

through the linea alba just above the umbilicus, and they are clinically differentiated from an umbilical hernia.

In a para-umbilical hernia, only a portion of the circumference of the umbilicus is involved, whereas, in an umbilical hernia, the entire circumference of the umbilicus is involved.

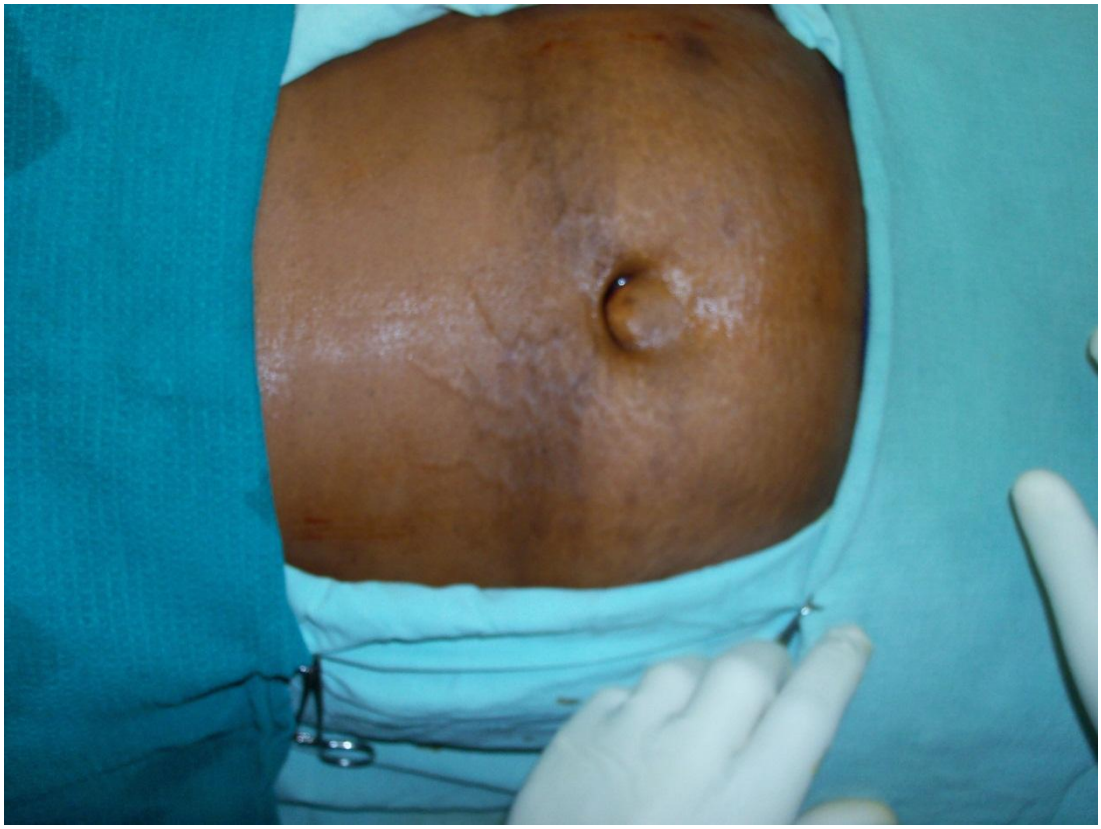


Fig 8: Para-umbilical hernia

Para-umbilical hernia displaces the umbilicus by their asymmetrical protrusion and do not evert and stretch the umbilical skin unless they become very large. The peritoneal sac is often irregular and loculated, in which the bowel may get trapped and strangulation may occur. As the risk of strangulation is high, surgery should usually be recommended. Para-umbilical hernia may be superior, inferior or lateral,

and are named accordingly, when they involve the superior, inferior or lateral circumference of the umbilicus.

EPIGASTRIC HERNIA (fatty hernias of the linea alba):

They occur at sites where neurovascular bundles penetrate the fascia, along which preperitoneal fat can get extruded into the defect. As the abdominal pressures increase, the defect continues to enlarge and allows the intra-abdominal viscera to enter. With regardless of the size, epigastric hernias have a greater tendency for incarceration and strangulation. Hernia that occurs below the linea alba is called as hypogastric hernias, which are very rare.

Epigastric hernias are classified into:

(1) lipomas without peritoneal sac,

(2) lipomas with a peritoneal sac containing omentum,

(3) omental hernias without a lipoma, and

(4) peritoneal sacs containing intestine and omentum.

LATERAL VENTRAL (SPIGELIAN) HERNIA:

Spontaneous ventral hernias are rare, but can occur through the linea semilunaris, linea transversalis, or the sheath of the rectus muscle. Lateral ventral hernia, a common type of spontaneous ventral hernia, is a defect at the spigelian (fascial) zone at any point along its length. This zone is bounded laterally by the muscular fibers of the internal oblique and medially by the lateral margin of the anterior lamina of the rectus

sheath. A peritoneal sac is present, containing preperitoneal fat or a viscus.

CLINICAL FEATURES AND DIAGNOSIS

CLINICAL FEATURES AND DIAGNOSIS

Patients with incisional hernia usually present with a bulge from a part or whole of the previous healed scar or incision. Patients usually present either for the symptoms or for a mere cosmetic disfigurement. Patients have dull abdominal discomfort and associated nausea due to stretching of the bowel mesentery as it protrudes through the defect. Incarceration in the hernia sac and twisting of the bowel around adhesions at the margins of the hernia defect may result in bowel obstruction [28, 29].

The natural history for an incisional hernia is gradual enlargement in its size. The linea alba in the midline is the region of aponeurotic insertions of the rectus sheath and the oblique musculature. Disruption of the linea alba results in gradual enlargement of the hernia defect due to the unopposed contraction of the oblique musculature laterally.

As the hernia defect widens, there is interference of the task-dependent functions of the abdominal wall musculature. Significant physiologic derangements can occur due to this, such as:

*) As the hernia widens, the synergistic function of the diaphragm and the abdominal wall in the act of respiration is lost, which results in paradoxic abdominal respiratory motion.

*) Trunk motion abnormalities are common in patients with incisional hernias.

*) Patients with large incisional hernias tend to have significant lumbar lordosis and disabling back pain. This is evidenced by the relief of back pain once the incisional hernia is repaired and the continuity of the midline myofascial aponeurosis is restored.

*) Expulsive functions such as acts of coughing, micturition and defecation are also compromised.

Dermatological changes can also occur as the incisional hernia enlarges. As the overlying skin gets stretched in such patients, the subcutaneous tissue atrophies and the skin at the apex undergo ischemic changes. This renders the skin to ulceration and super-added infection.

Patients with umbilical hernia usually have soreness at the site of the hernia, colicky abdominal pain and occasionally, vomiting. Examination usually reveals a swelling with expansile cough impulse above, below or at the umbilicus. When it is small, the swelling is usually reducible, but with time, the swelling becomes irreducible, because of the adhesions of the omentum and the loops of intestine, which can be detected by palpation, percussion and auscultation over the swelling. Para-umbilical hernia also presents with similar symptoms and

signs, except for the fact that the swelling occupies only a portion of the circumference of the umbilicus in them.

About three-fourths of the patients with epigastric hernia remain asymptomatic. In the remaining, the commonest presentation is that of pain, which is more severe over the epigastric region and aggravated by coughing, straining and physical exertion. The pain is wrongly interpreted to be due to peptic ulcer, gall bladder or other causes of dyspepsia. Superficial pain and tenderness on palpation differentiates it from the above causes.

MANAGEMENT

MANAGEMENT

Before deciding to proceed with surgical management of ventral hernias, there are certain things which are to be kept in mind in the pre-operative period:

*) Any other medical co-morbid condition the patient is suffering from should be addressed.

*) If the patient is a diabetic, he or she should have attained adequate glycemic control or else, they are more prone for secondary infection or impaired wound healing.

*) If the patient is suffering from any respiratory ailment, this should be treated first. Otherwise, the patient would be having a compromised respiratory reserve which could lead to the failure of the surgery and cause a recurrence.

*) If the patient is obese, weight reduction should be achieved. It has been proved that the incidence of recurrence is higher in patients with a body mass index of more than 30.

*) In large ventral hernias, an attempt to push back the contents into the abdominal cavity, where they were not present for several years is to court danger. This will not only lead to failure of the hernia repair,

but also will cause respiratory complications from elevation of the diaphragm and paralytic ileus due to visceral compression.

*) For them, the abdominal cavity has to enlarged by prolonged pneumoperitoneum, in which the intra-abdominal pressure is increased to about 15-18 cm H2O several weeks prior to surgery. This can be done by inserting a sterile, plastic intra-venous catheter through the abdominal wall into the peritoneal cavity.

On confirming with a radiograph after injecting several millilitres of contrast media, 300 ml of air is to be injected and repeated each day with increasing amounts of air, for about 10 - 14 days. During this time, a daily installation of 500 - 1000 ml/ day would have been tolerated and the abdominal wall would have stretched to contain the viscera comfortably after surgery.

*) As many of the patients are old, concomitant intra-abdominal problems, such as gallstones, adhesions with the small intestinal loops, intra-abdominal malignancy, etc. have to be addressed.

*) As treatment with mesh repair is the rule for every ventral hernia patients, all patients to be screened for any of the above intra-abdominal diseases, as any surgery for them in the future would be difficult after a mesh has been placed.

*) Patients with a habit of smoking should be advised to quit the habit. It not only causes complications with anaesthesia, but also increases the chances of recurrence.

*) Intestine and bladder functions are to be evaluated, as these are co-existing in patients with ventral hernia who are usually old and might continue to cause an increase in intra-abdominal pressure, which might lead to recurrence.

SURGICAL MANAGEMENT:

According to David Sanders & Andrew Kingsnorth [30]:

"A common-sense approach is advocated. If the patient can safely have general anaesthesia and the chance of successful repair is reasonable, then surgery is indicated. If the patient presents a high anaesthetic risk or surgical repair will be technically difficult, then the size of the fascial defect relative to the hernia, the symptom complex, the patient's age, and the patient's preferences must be carefully considered. In such cases, conservative management may be more appropriate. This decision making process is patient specific."

Operative treatment is indicated in all patients with ventral hernias, except in those whose general condition is too poor to withstand the surgery or for the few in whom there is no prospect for reducing the

hernia and closing the defect. Patients who are poor candidates for surgery with comorbid conditions, and particularly with a wide or large hernia defect, in whom the risk of obstruction or strangulation are less, can be managed conservatively.

An abdominal binder or belt can be used in them, which may provide some comfort for such patients and may be used for palliation in them, in whom surgery is contraindicated. Small ventral hernias can also be temporarily controlled by such conservative management, but no spontaneous cure can be expected. In course of time, these small hernias progress in size and become candidates for hernia surgery.

Repair of a ventral hernia can be an easy and safe procedure, but can also represent an ultimate surgical challenge and risk to the operating surgeon. The determinants of the success of the repair depend not only on the size and history, but also on the location. Ventral hernias near the xiphoid process, rib margins and pubis are difficult to repair than their size would indicate. Attachments of the layers to bone and hernias closer to them may make repair of the ventral hernia a difficult procedure, as at those places, mobilisation becomes a problem for even smaller hernia defects to get closed.

Three general classes of operative repair can be done for patients with ventral hernia. These include:

1) Primary suture repair of the hernia

2) Open repair of the hernia with prosthetic mesh

3) Laparoscopic ventral hernia repair.

The plethora of such multitude of techniques for surgical management of ventral hernia is attest to the historically high recurrence rates. The recent explosion in interest in the laparoscopic surgical approach over the last few years is also a proof for the search of a proper and right technique in the management of ventral hernias.

GENERAL PRINCIPLES IN SURGICAL MANAGEMENT:

*) General anaesthesia is usually preferred to achieve full relaxation of the abdominal musculature, but continuous spinal anaesthesia can also be used in appropriate situations. Local anaesthesia is reserved for smaller hernias.

*) The choice of the skin incision is governed by several factors, such as location of the previous scar and the character of the skin. The incision should generally be parallel to the long axis of the hernia. The scarred, atrophic and infected skin must be excised. Any unexpected deep abscesses around the previous suture sites should be excised and every effort must be done to limit or avoid contamination.

*) While making the incision, great care must be taken to avoid opening the sac, as the sac may be in the subcutaneous plane and covered only by the overlying skin and the atrophic subcutaneous tissues. The adherent subcutaneous layer should be dissected off the sac carefully.

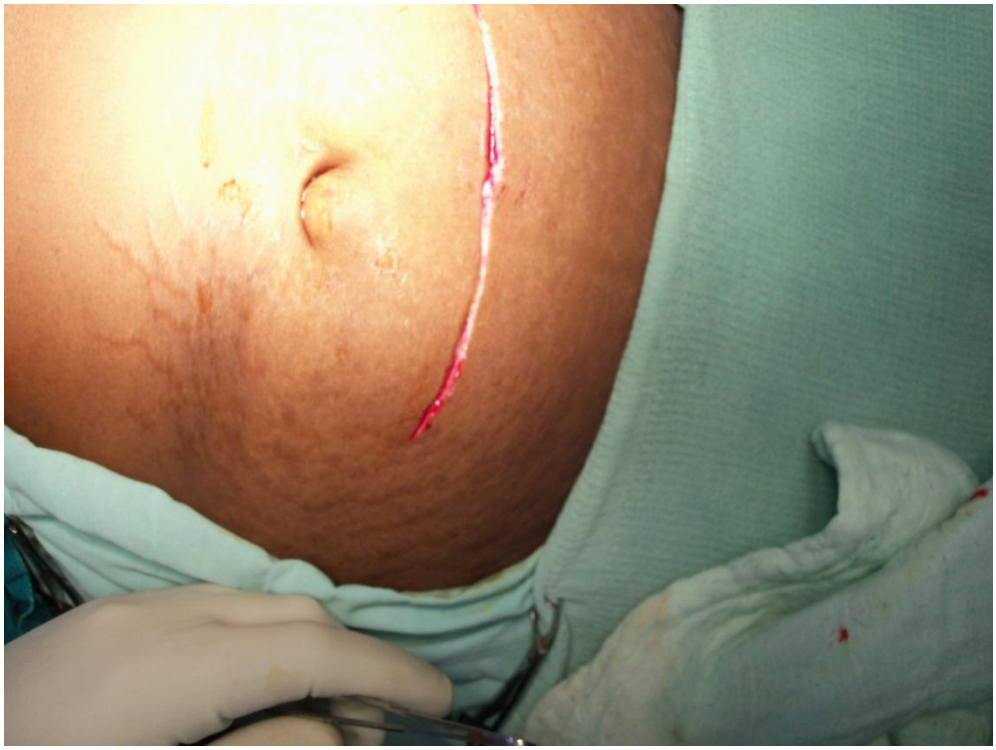


Fig 9: Appropriate incision is made

*) After making an appropriate incision, it is deepened up to the rectus abdominis and then flaps are elevated above or below, so that the sac and its contents can be delineated and surrounding fat is cleared off the sac.

Fig 10: Flaps are elevated

*) After exposing the entire circumference of the neck of the sac and the hernia ring, the neck of the sac is opened, cleared off the contents, and the sac neck transected.

*) The fibrous hernia ring should be excised around its entire circumference, so that a normal appearing, unscarred tissue is left behind for closure.

*) Non-absorbable sutures are used to repair the ventral hernias because several studies have showed lesser incidence of recurrence when compared with that of absorbable sutures.

Fig 11: Hernial sac isolated

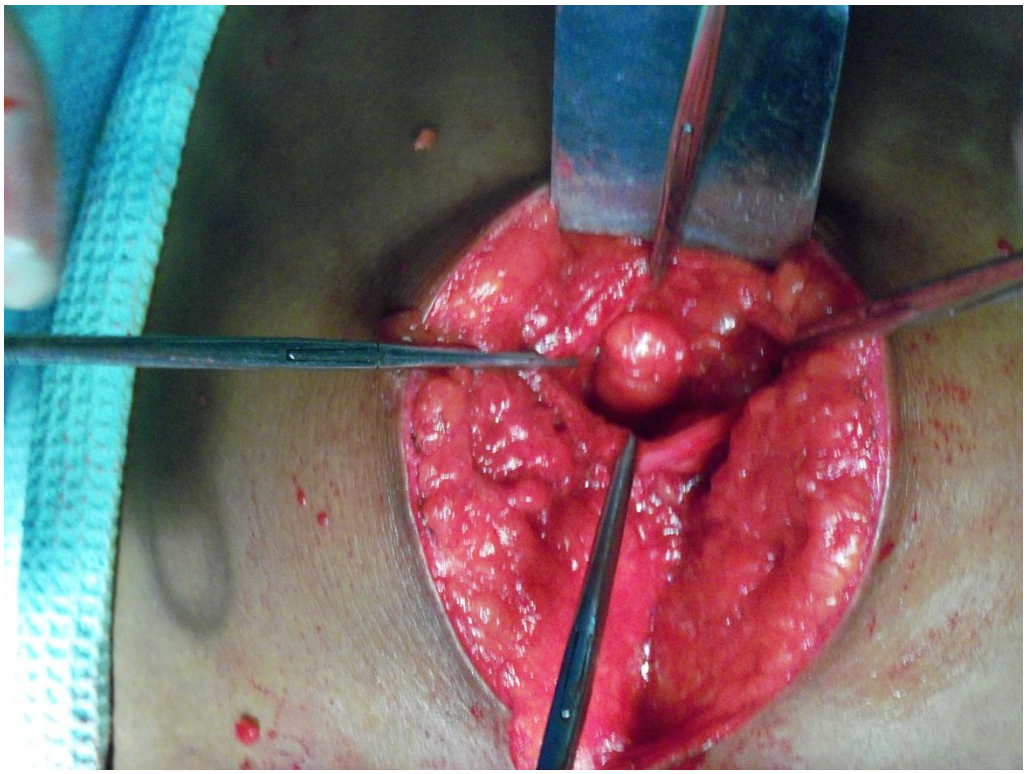


Fig 12: Sac opened & contents reduced

*) If a prosthetic mesh is used, it is fixed using interrupted non-absorbable sutures, such as 2-0 polypropylene.

*) Complete haemostasis to be checked after the procedure, otherwise this would lead on to hematoma formation and secondary infection of the wound.

*) A suction drain can be placed under the subcutaneous tissue level, where flaps have been raised and this dead space could be a source of a collection of blood or seroma formation. Suction drain has to be brought through a separate stab wound.

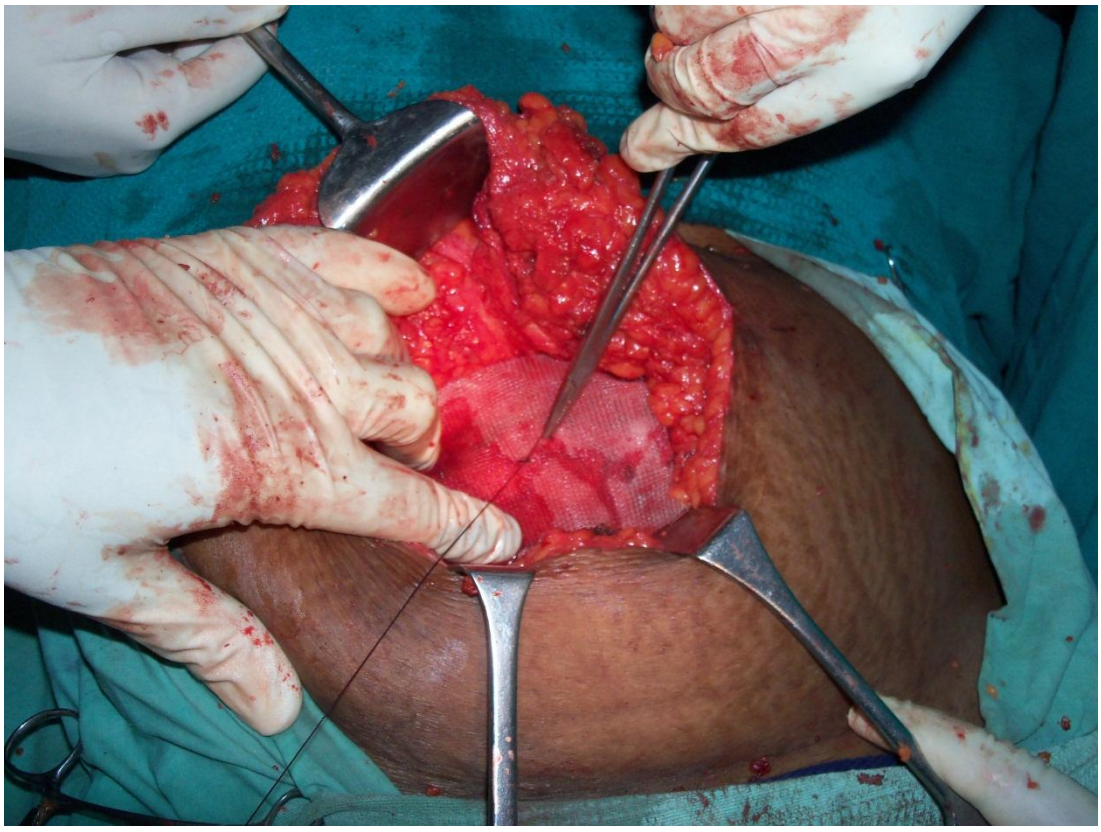


Fig 13: On-lay mesh fixation done

Fig 14: Skin suture after fixing a drain

*) The patient should be put on appropriate antibiotic cover for the skin flora.

Fig 15: Well healed incision, after an open mesh repair

PRIMARY SUTURE REPAIR:

In general, primary suture repair of incisional hernia can be performed for hernia defects of diameter less than 4 cm with strong, viable surrounding muscular tissue. Simple closure by primary suturing is applicable for the repair of:

*) small ventral hernias (< 4 cm),

*) moderately sized incisional hernias in the median line, and

*) in hernias which have elliptic defects of narrow width.

After making an appropriate incision, layers are deepened up to rectus abdominis level, flaps raised, sac delineated, adherent omentum and bowel loops released, and surrounding fascia cleared off the fat tissue all around the sac for about 3 - 4 cm margin, so that this allows for a margin of healthy fascia to be brought together in the midline with suture closure.

The fascial defect is closed using a layer of continuous non-absorbable suture by taking large bites of the cleared, clean fascia on both the sides of the defect. The defect is closed transversely or vertically, whichever way causes the least tension. The fascia is examined for presence of any other additional defects and also for any

excessive tension of the sutures, which would cut through the tissues. If excessive tension is present, relaxing incisions, parallel to and at a distance away from the suture line are made to relieve the tension.

Complex apposition consisting of various types of closure, such as Mayo, Keel, Da Silva are now considered obsolete and are now of historical interest only.

OPEN HERNIA REPAIR WITH PROSTHETIC MESH:

This technique is now preferred for treatment of all ventral hernias, except for the smaller defect (< 4 cm), as the placement of prosthetic mesh has been proved to cause lesser incidence of recurrence and other post-operative complications than that by simple closure. The use of the prosthetic mesh over the hernia defect and fixing it to the abdominal wall is the one, which is routinely employed nowadays [31].

Many variations of the mesh repair for the ventral hernias have been described. The above procedure is followed up to the delineation of the hernial sac, opening the sac, releasing the adherent omentum and bowel loops, and clearing the surrounding fascia off the fat to about 5 cm all around, and then, the prosthetic mesh is placed at the required site, and the components are separated appropriately. The various sites of placement of prosthetic mesh are:

*) Onlay repair - Prosthetic mesh is placed superficial to the rectus sheath and the 3 abdominal wall muscles.

*) Inlay repair - Bridging prosthetic mesh is placed between the anterior and posterior rectus sheath over the defect. Here, the rectus muscle is not separated from the posterior rectus sheath.

*) Sublay (Pre-peritoneal) repair [32] - Here, a preperitoneal plane is created between the rectus muscle and the peritoneum, and then, the prosthetic mesh is placed in between these 2 layers. This can be non-bridging or bridging, depending on the way the mesh is placed over the defect, with or without primary closure of the hernia defect.

*) Onlay repair combined with components separation - Here, if the defect is wide enough such that primary suture closure of the hernia defect is not possible, then muscle relaxing incisions are made laterally, for the rectus muscle to slide medially and then the defect can be closed by primary suture closure. A mesh can then be placed optionally over the fascial defect and over the relaxing incision sites. This technique was popularised by Ramirez and his colleagues, famously known as Ramirez component separation technique [33], which is of historical interest now.

Then, the other remaining steps are followed such as placement of suction drain, suturing of the subcutaneous tissue and then the skin. The

onlay prosthetic mesh placement is the usually followed technique. But, with the experience of laparoscopic repair, placement of prosthetic mesh in the pre-peritoneal plane is increasing now.

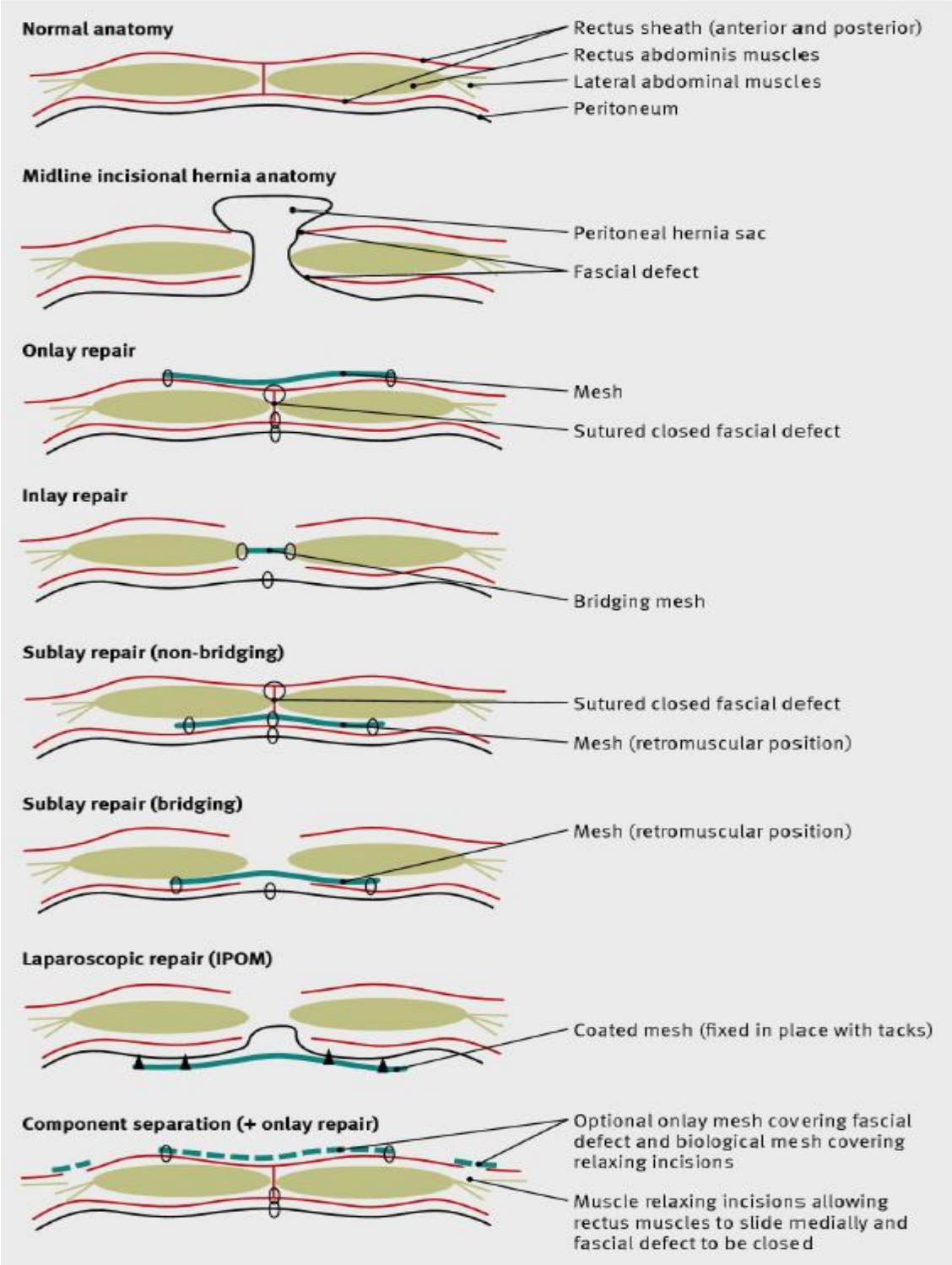


Fig 16: Various techniques of mesh fixation

LAPAROSCPIC VENTRAL HERNIA REPAIR:

The management of ventral hernia has advanced from open mesh repair to the laparoscopic repair. Here, the defect is repaired posteriorly and no dissection is required within the scarred layer of anterior fascia. The laparoscopic approach allows for the identification of additional small, yet not clinically manifesting defects in the anterior abdominal wall during the repair.

One such entity is called as the SWISS-CHEESE HERNIA [34], in which there are numerous small holes or defects in the fascia, and all of them need to be repaired, either individually or as one large repair, which is easily possible with the laparoscopic approach.

The steps involved in the laparoscopic approach are:

- Port access into the peritoneal cavity, via the left upper quadrant, along the anterior axillary line.
- Extensive laparoscopic lysis of the adhesions to gain exposure to the entire hernia defect, so as to provide a 3-4 cm circumferential area of overlap for the mesh patch beyond the edge of the defect.
- Retraction and excision of the sac from within the hernia.
- Appropriate sized mesh is cut, rolled so that the anterior surface remains inside, inserted into the peritoneal cavity through the port,

unrolled inside and fixed over the defect using non-absorbable sutures, tacks or staples.

BIOMATERIALS OR PROSTHESIS:

The prosthetic material used in the management of ventral hernias has undergone a tremendous change, right from the days when stainless steel and tantalum were used. Then, polyethylene was used since 1958 and it didn't gain popularity as it could not be sterilized. Then, polypropylene mesh, which could be autoclaved was introduced in 1962, and it remained the most commonly used prosthetic over the next 40 years, and even still remains the common one. Of late, there has been a large increase in the meshes available for ventral hernia repair.

The two types of meshes that are in use now are:

*) Synthetic mesh: The three commonly available synthetic mesh are made up of polypropylene (PPM), polytetrafluoroethylene (PTFE) [35] and polyester, either alone, or combination of these, or combination with an absorbable component, such as a vypro mesh, which is made up of polypropylene and polyglycolic acid. The mesh can be heavy weight, medium weight, light weight or even ultra-light weight. Reducing the polypropylene component in the mesh makes it so light and flexible, that

it can be too difficult to handle, which is overcome by the addition of the absorbable component, as that in a vypro mesh.

Barrier meshes are available which could be safely placed in the intra-peritoneal location [36], as in an intra-peritoneal onlay mesh repair in a laparoscopic approach, without any concern of ingrowth of the viscera and adhesion formation, which could be a major disadvantage with the routine meshes.

Dual mesh was introduced in 1994 by W. L. Gore, which has a large pore size on the ingrowth side (on the side that goes against the abdominal wall) for good collagen ingrowth and a micro porous structure on the other side, that goes against the bowel and prevents the ingrowth of viscera and adhesion formation, when placed intra-peritoneal.

Polyester mesh gained popularity with the retro-rectus repair of Rives' for ventral hernia, that allows placement of the mesh behind the defect with board overlap, but off the viscera, thereby preventing visceral ingrowth, adhesion, fistula and difficult subsequent surgery problems. The advantage of polyester is that of being soft and supple. It conforms readily, and doesn't stiffen or harden as much as a polypropylene.

*) Biologic mesh: The last few years has seen a number of biologic mesh available for the management of ventral hernias. The common principle behind these meshes is to take animal or human tissue, get rid of the cellular component to avoid allergic reaction and stabilise its protein structure so that it can act as a scaffold. These are considered as the collagen implants which allow native fibroblasts to deposit more collagen to form a biologic mesh.

The biologic meshes are very much expensive and have been introduced without long term evaluation. It also becomes a problem in patients with collagen disorder, as they rely on the native host collagen for long term strength. These biologic meshes are not a permanent mesh solution to ventral hernia repair, but are considered an alternative to absorbable mesh like polyglyconate in contaminated situations.

UMBILICAL HERNIA:

In many adults, surgery for an umbilical hernia is contraindicated because of the associated obesity and ascites. And in some others, surgery is considered unnecessary or left undone with. But, surgery is the treatment of choice in most of the patients.

The indications for surgical management of umbilical hernia are in pateints with:

*) strangulated or obstructed umbilical hernias,

*) irreducible umbilical hernias because of the danger of later strangulation, and

*) reducible umbilical hernias that are increasing in size or causing symptoms, unless there are contraindications.

PROCEDURES:

A number of procedures have been in practise. All of them have in common the following steps:

1) Appropriate incision and deepening of the same

2) Isolating and opening the sac

3) Reducing the contents of the sac

4) Excising the redundant portion of the sac

5) Closure of the sac by suturing

6) Approximating or imbricating the fascia of the rectus sheath, that formed the hernial opening, thereby repairing the defect

7) Reinforcing the defect with the prosthetic mesh

8) With or without excising the elliptical fold of skin over the umbilicus

TRANSVERSE ELLIPTIC INCISION WITH OVERLAPPING OF FASCIA:

This is commonly known as the MAYO's "vest over pants" technique, which can be used for all sizes of umbilical hernias and is particularly a useful and satisfactory technique for large or complicated hernias.

The following steps are done:

1) A transverse elliptical incision is made surrounding the hernial swelling.
2) The umbilicus and the hernial sac are excised and the peritoneum closed, with good exposure of the anterior rectus sheath.
3) Interrupted mattress sutures are put in place to fix the lower leaf of the rectus under the upper leaf.
4) The upper leaf is imbricated anteriorly over the lower leaf.

RAJASINGHAM OPERATION:

It is usually advocated for those umbilical hernias associated with a wide diastasis of the lower rectus muscles.

The following steps are done:

1) Skin incision

2) The sac and surrounding tissues to be removed.

3) The cut margins of the peritoneum, transversalis fascia and linea alba are approximated.

4) A vertical incision is made over the anterior rectus sheath at their medial borders, which should be of the same length as that of the opened peritoneum.

5) The medial edges of the incised rectus sheath is approximated, which buries the subjacent suture line, that had previously approximated the peritoneum, transversalis and fascia alba.

6) The final row of sutures approximates the lateral incised edges of the rectus sheath from each side and brings the rectus muscles closer together and enclosing them in a common sheath.

EPIGASTRIC HERNIA:

Asymptomatic, reducible and small epigastric hernias diagnosed only on routine examination can be safely left as such. In children, this is particularly true as there is every chance for the hernia to close spontaneously as the child grows older.

Surgery is indicated in all patients with epigastric hernias, which are symptomatic, are growing larger, or are already large at the time of presentation.

The two methods of surgical repair for epigastric hernias are:

*) Intra-peritoneal method is indicated for epigastric hernias that are definitely known to contain viscera, hernias with symptoms suggestive of visceral involvement, and strangulated hernias. It is also advised in patients, in whom the presence or the exact location of the hernia is uncertain or when another intra-abdominal lesion is suspected.

A variation of intra-peritoneal method is McCaughan repair, which allows for an extensive intra-abdominal exploration, before the closure of the peritoneum, if required and if pre-operative evaluation suggests its desirability.

*) Extra-peritoneal method is indicated for properitoneal lipomas and small hernias of known presence and location. Properitoneal lipomas are ligated as high as possible and excised. If a sac is found, it should be opened, contents reduced, sac isolated, ligated flush with the peritoneal surface and the redundant portion excised. Alternately, an empty, unopened sac is freed and inverted.

DIASTASIS OF RECTI:

Management of the diastasis of recti needs a mention here. Small and asymptomatic divarication need not be intervened, and can be safely ignored or managed with a rigid abdominal support. Symptomatic and increasing diastasis is corrected by making an incision in the midline of the linea alba and approximating the separated edges to bring back the

recti muscles together, after thorough cleaning of the surfaces to be approximated.

Fig 17: Umbilical hernia with diastasis of recti

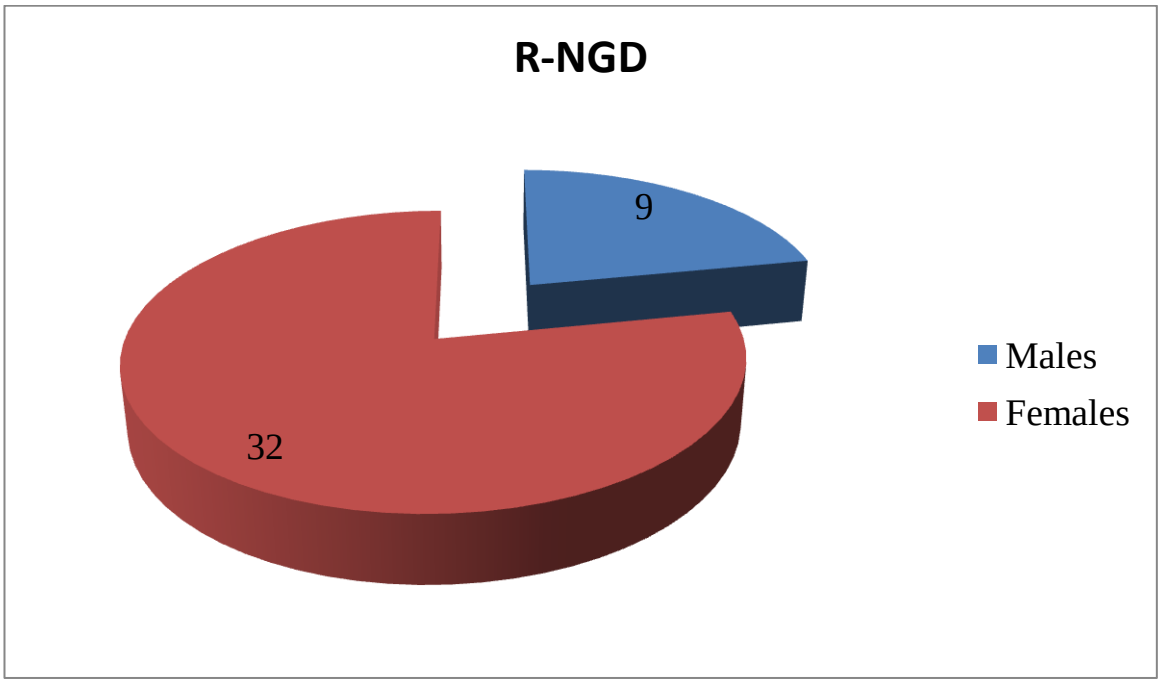
OBSERVATIONS AND DATA ANALYSIS

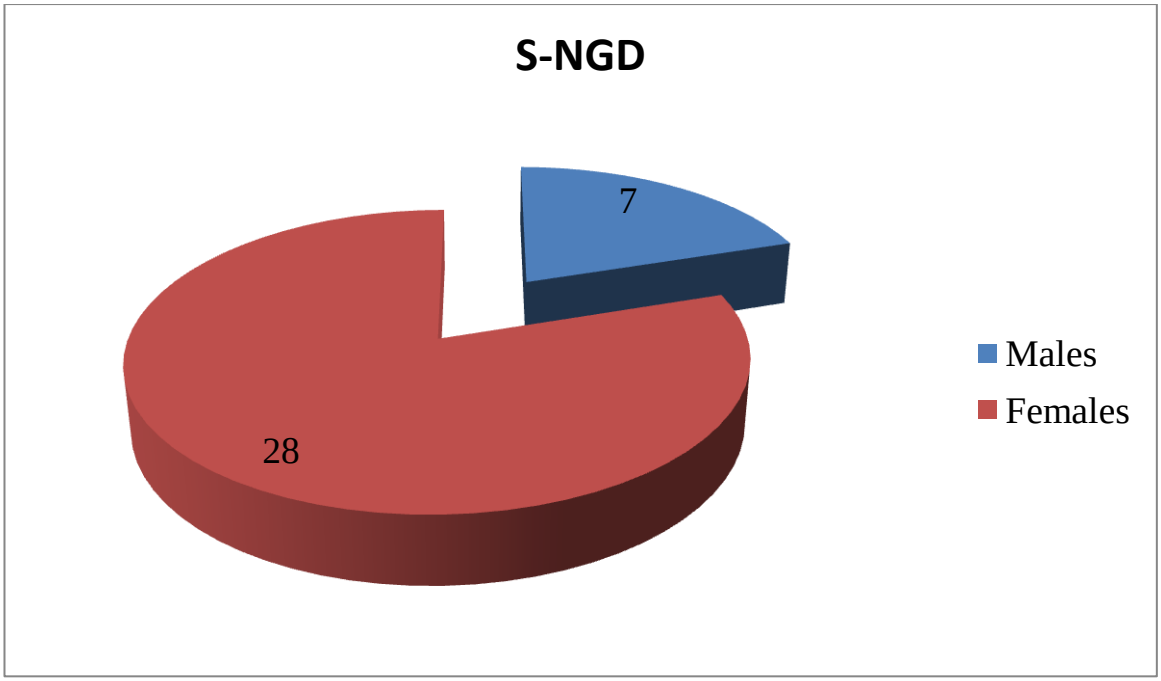
OBSERVATIONS AND DATA ANALYSIS

The following observations were made from the study:

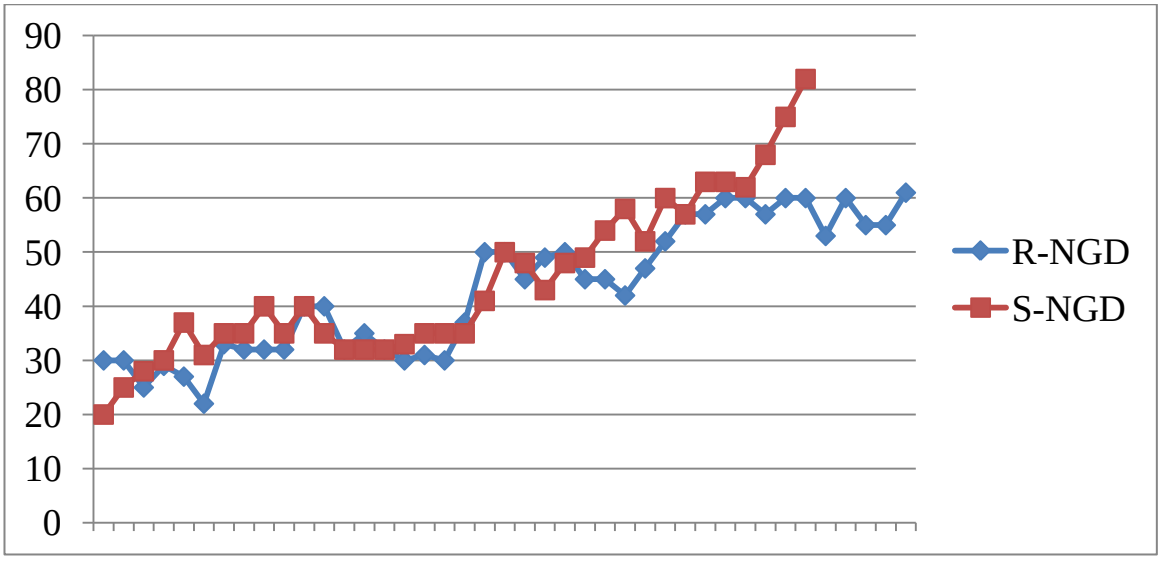
*) 41 patients came under the routine nasogastric decompression (R-NGD) group; 35 patients came under the selective nasogastric decompression (S-NGD) group.

*) Among the R-NGD group, 9 were male and 32 were female patients. Among the S-NGD group, 7 were male and 28 were female patients. This reiterates the fact that ventral hernias are commoner in females than in males, partly due to more number of surgeries, the females undergo, particularly the caesarean section surgeries.



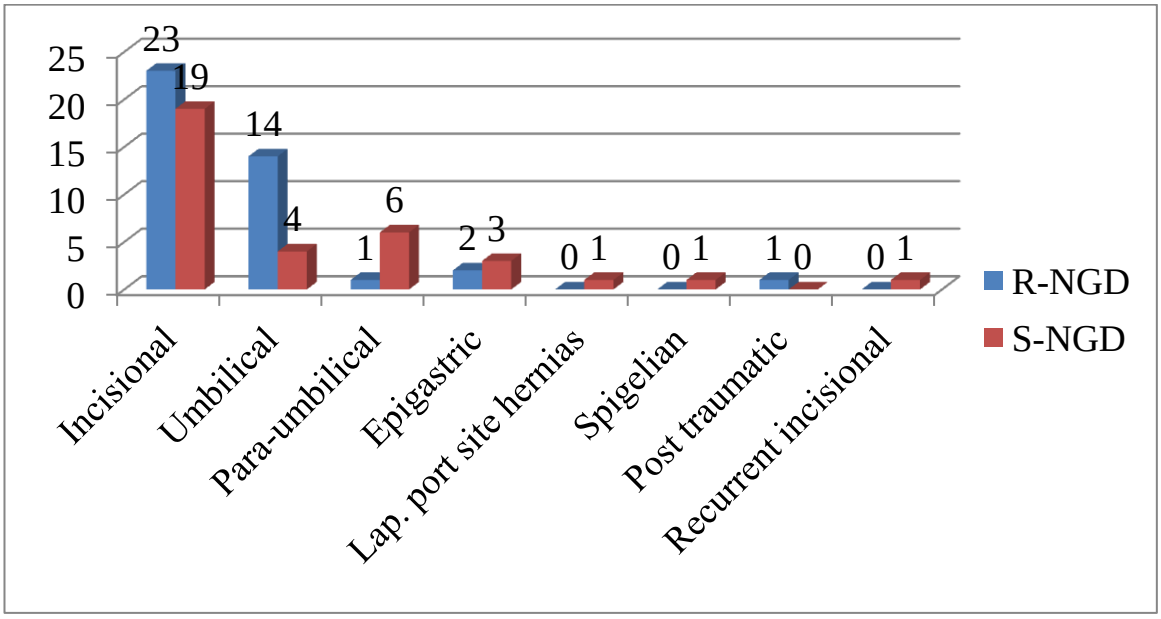


*) The range of age for the patients belonging to R-NGD was between 22 - 61 years. While, for the S-NGD group of patients, it ranged between 20 - 82 years. The average age for the R-NGD and S-NGD group of patients was 40.76 and 44.66 years respectively.



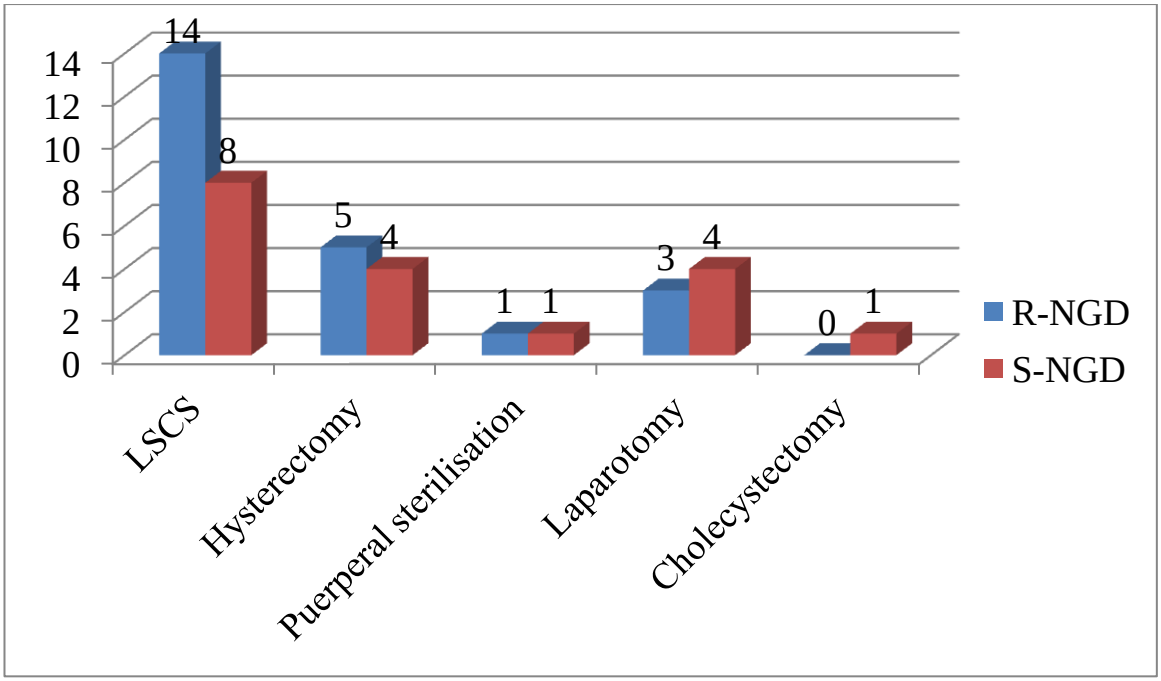
AGE COMPARISON

*) Incidence of different types of hernia were:



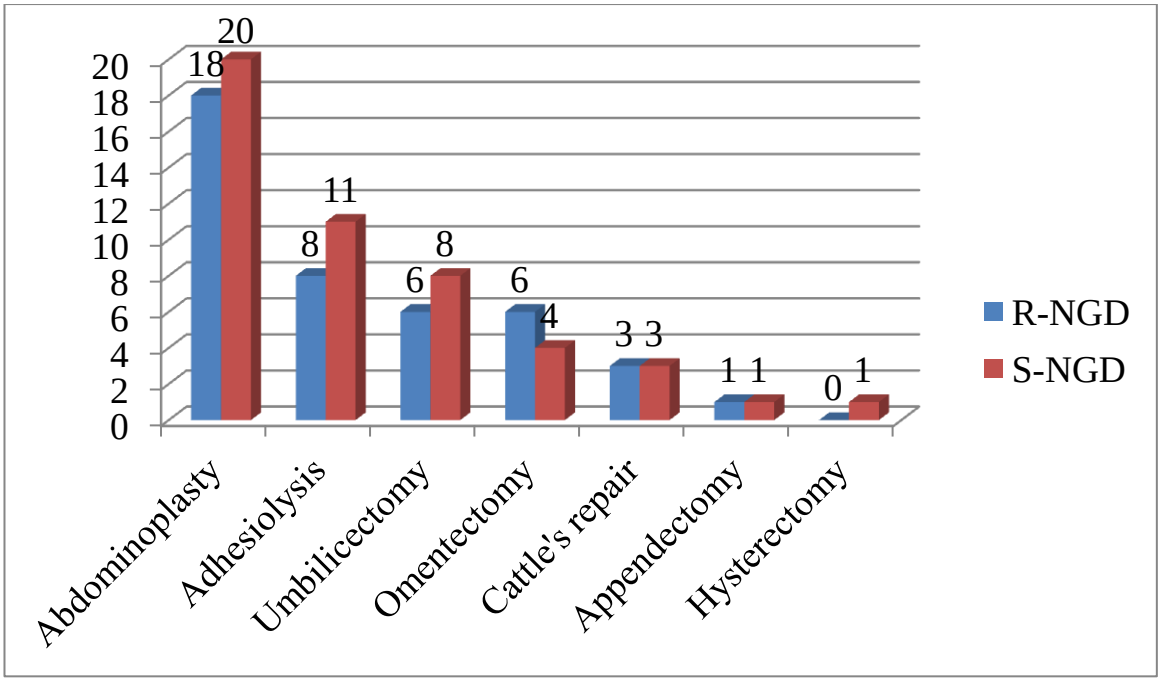
The above graph shows that incisional hernia was the commonest type of ventral hernia in both the groups. There were also some rare types of herniae, such as laparascopic port site, spigelian and post traumatic herniae.

*) The etiology for the above percentage of patients with incisional hernia were:



The above graph shows that gynaecological surgeries form the major cause of post operative ventral hernia, and this is why, they are commoner in females.

*) A number of additional procedures were done along with open ventral wall hernia repair with mesh. The below graph explains why the present study would amount to be a feasible one, as several intra-abdominal procedures were done along with hernia repair.



Other interesting observations were:

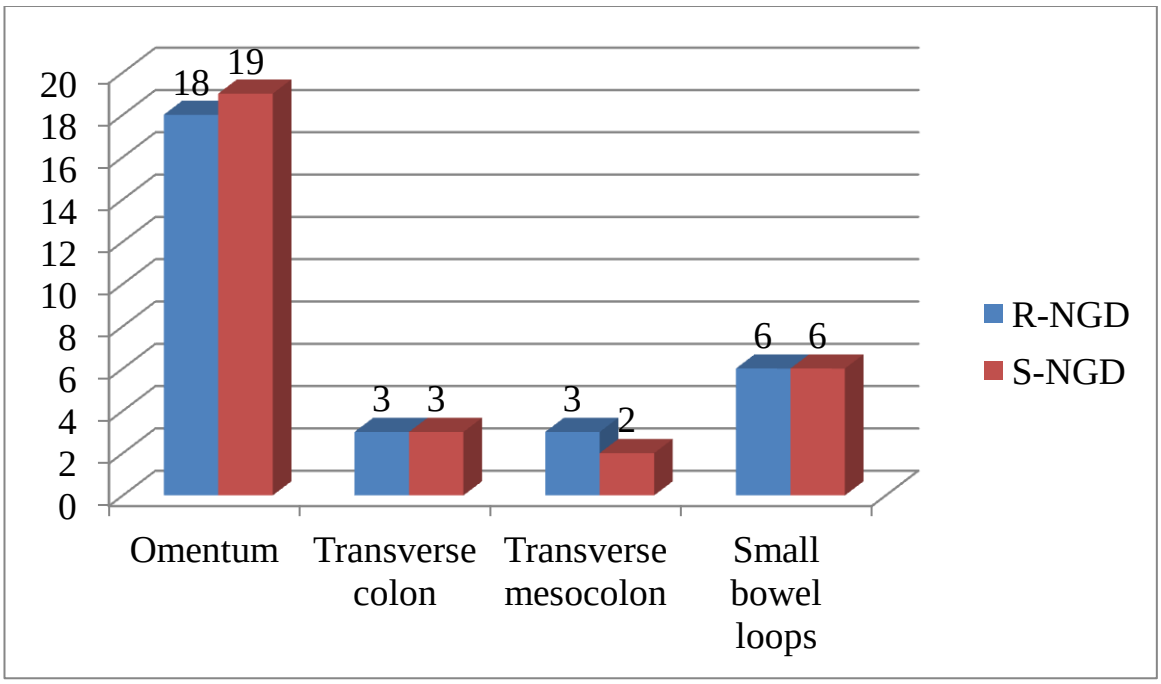
*) As there was loosening of the skin over the abdomen, abdominoplasty was done in a majority of the cases, so as to have a cosmetic effect.

*) Adhesiolysis was also done commonly, as there adhesions of the content with the sac and also, with the contents.

*) Umbilicectomy was done in a majority of umbilical herniae, as raising of the flap at the level of umbilicus, to separate the sac with its contents, could lead to necrosis of the umbilicus.

*) Cattle's repair was done in patients, who had recti diastasis or divarication of recti, which was commonly associated with umbilical herniae, as the same pathology exists in both the conditions.

*) The following formed the contents in the above set of patients:



This graph shows that omentum formed the content in most of the hernias, followed by small bowel loops.

MAIN RESULTS

From the above set of patients, 30 patients were selected from each of the group. They were selected based on the following:

*) Ventral hernias with large defects.

*) Hernial sacs contents adherent to one another.

*) Patients, in whom, at least a minimal handling of bowel and omentum occurred, so that this study would become feasible and the post-operative ileus might really be a factor.

*) Hernia repair associated with abdominoplasty.

Patients with selective nasogastric decompression (S-NGD) had an earlier return of bowel function, a decrease in pulmonary complications, no increase in wound infection and no increase in the recurrence rate of incisional hernia. Vomiting, particularly in the post-operative period seemed to favour routine tube use, but many of the patients with routine nasogastric decompression (R-NGD) had an increased sensation of discomfort.

Two of the patients from the R-NGD group had removed their Ryle's tube by themselves, before their intended time of removal. Length of stay was shorter among the S-NGD group of patients. The study also showed that routine use of nasogatric decompression, rather

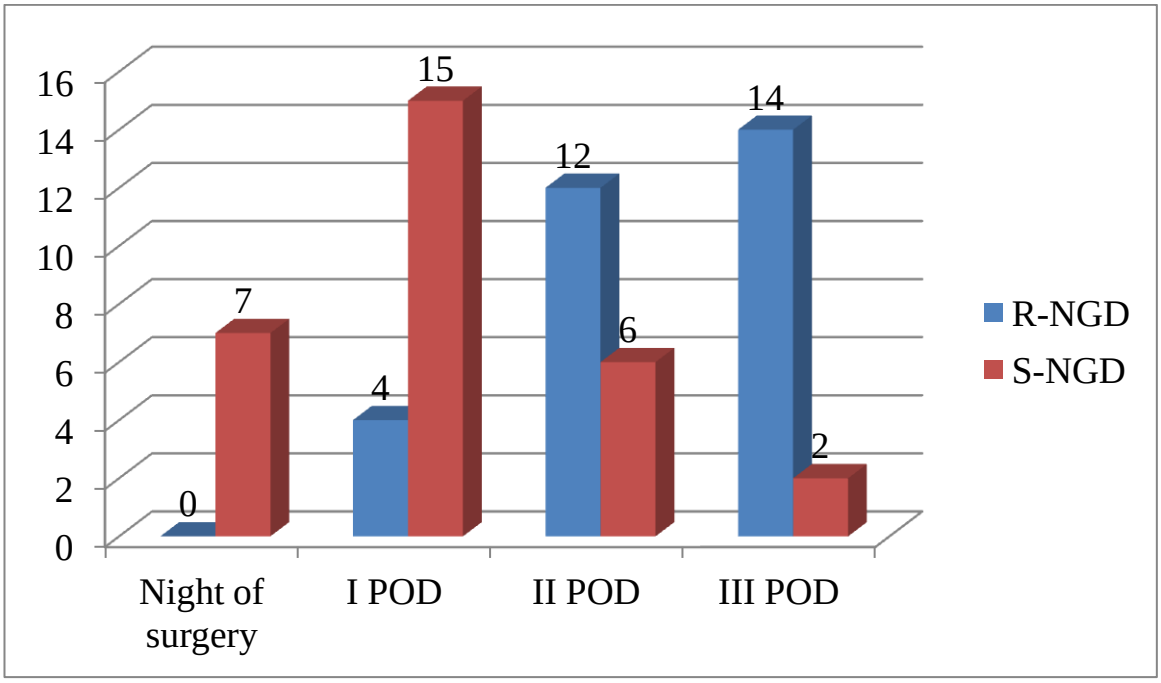
than speeding the recovery, had actually slowed down their recovery and increased the risk of post-operative complications.

The following outcomes were measured, in both the groups:

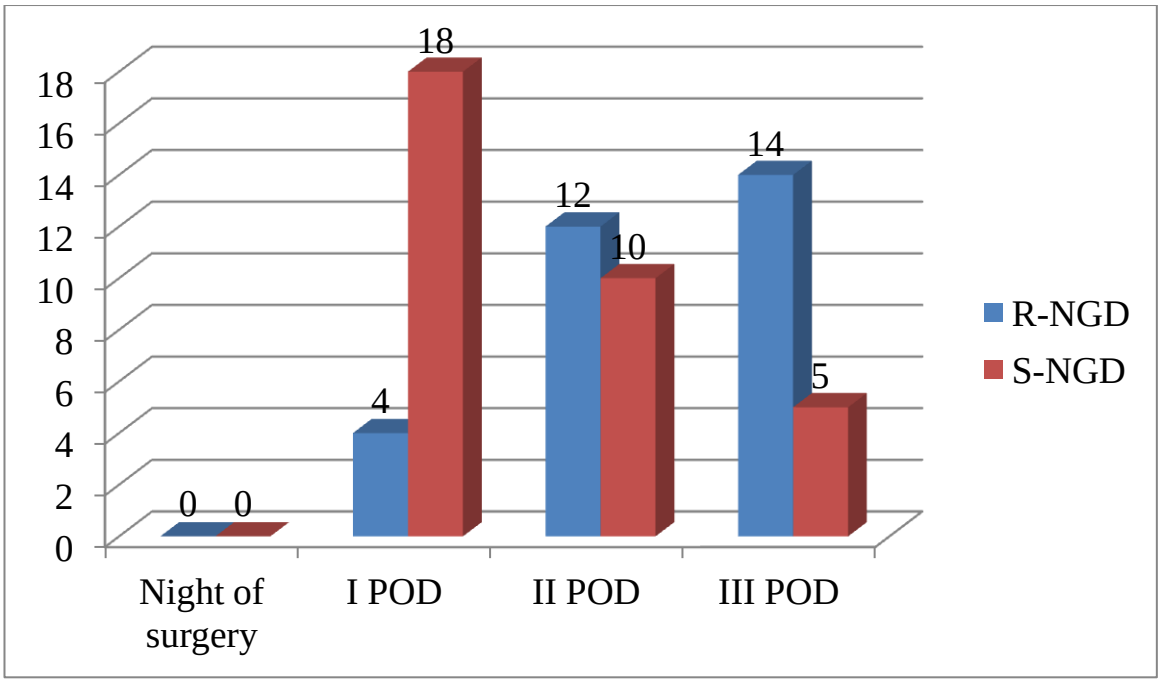
- Time to first flatus
- Pulmonary complications: a composite of both atelectasis and pneumonia
- Fever
- Wound infection
- Length of hospital stay, or post-operative hospital stay
- Wound dehiscence
- Incisional hernia recurrence
- Gastric upset in the terms of nausea and/or vomiting
- Need for tube insertion/reinsertion
- Mortality
- Pain or discomfort that is tube related
- Adverse events related to tube insertion

Return of gastrointestinal function:

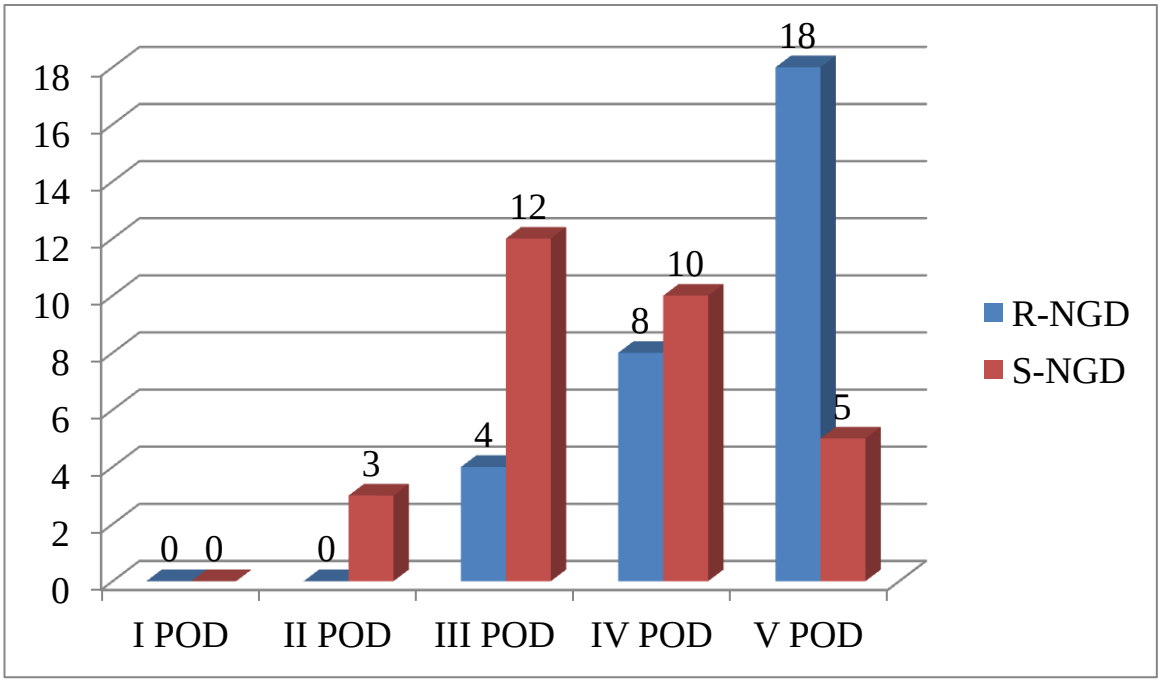
Time to first bowel sounds:



Time to first passage of flatus:

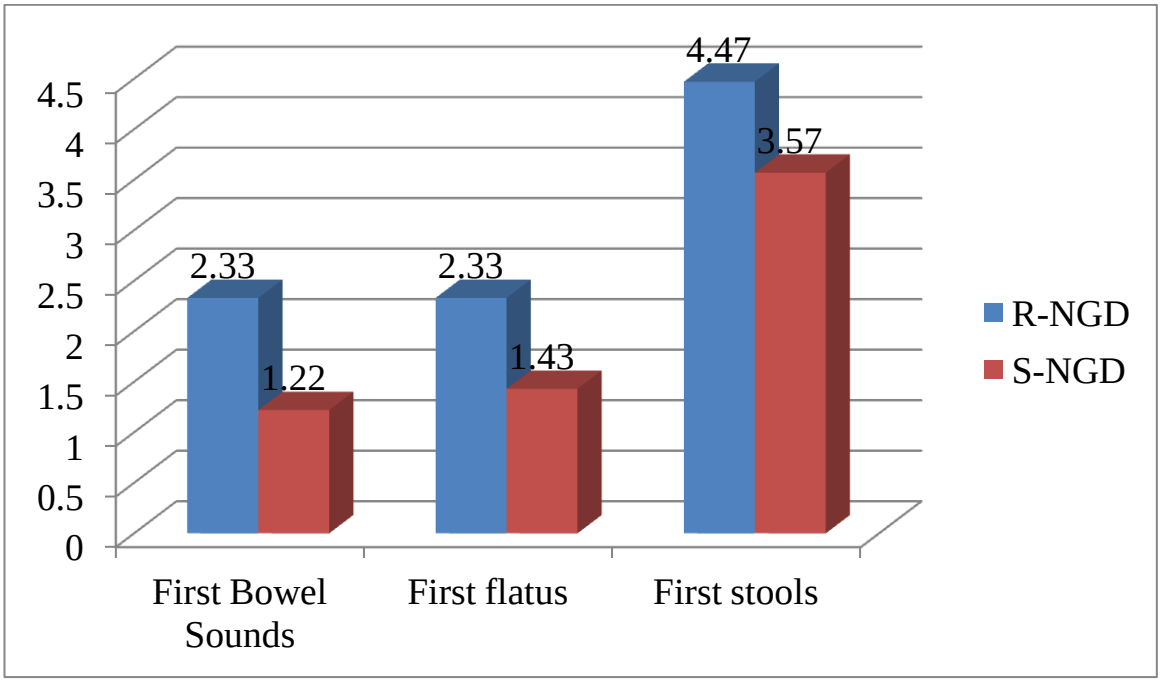


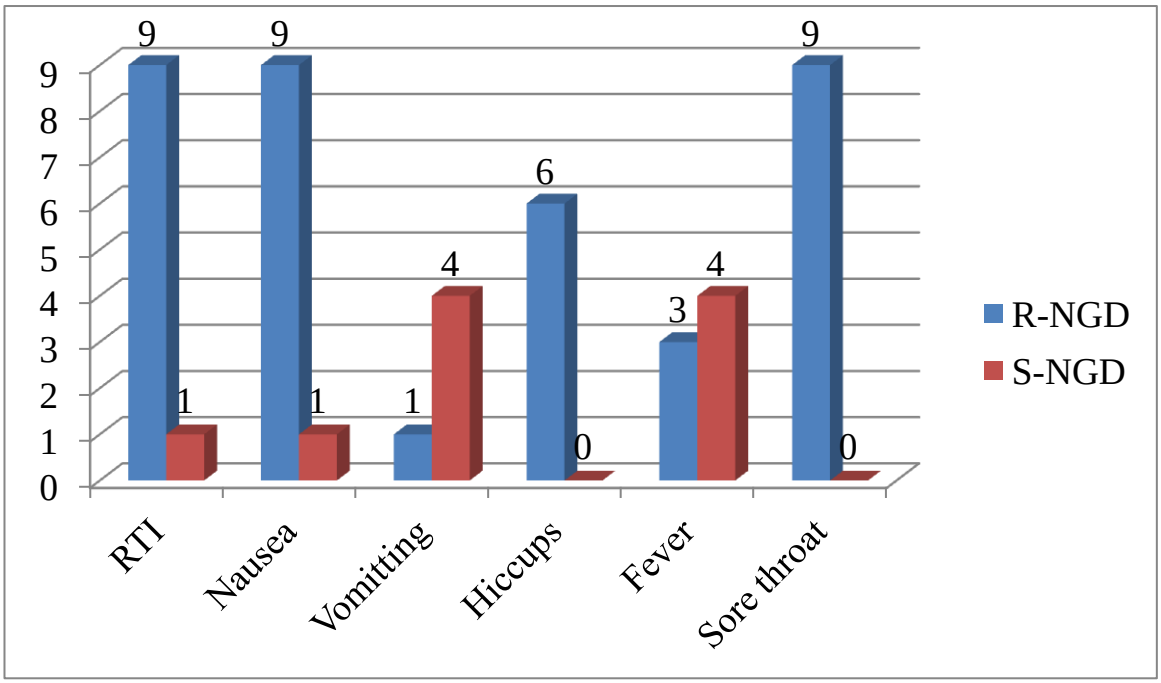
Time to first passage of stools:



The above 3 graphs show that there was an early return of gastrointestinal function among the S-NGD group of patients.

Comparison of events:

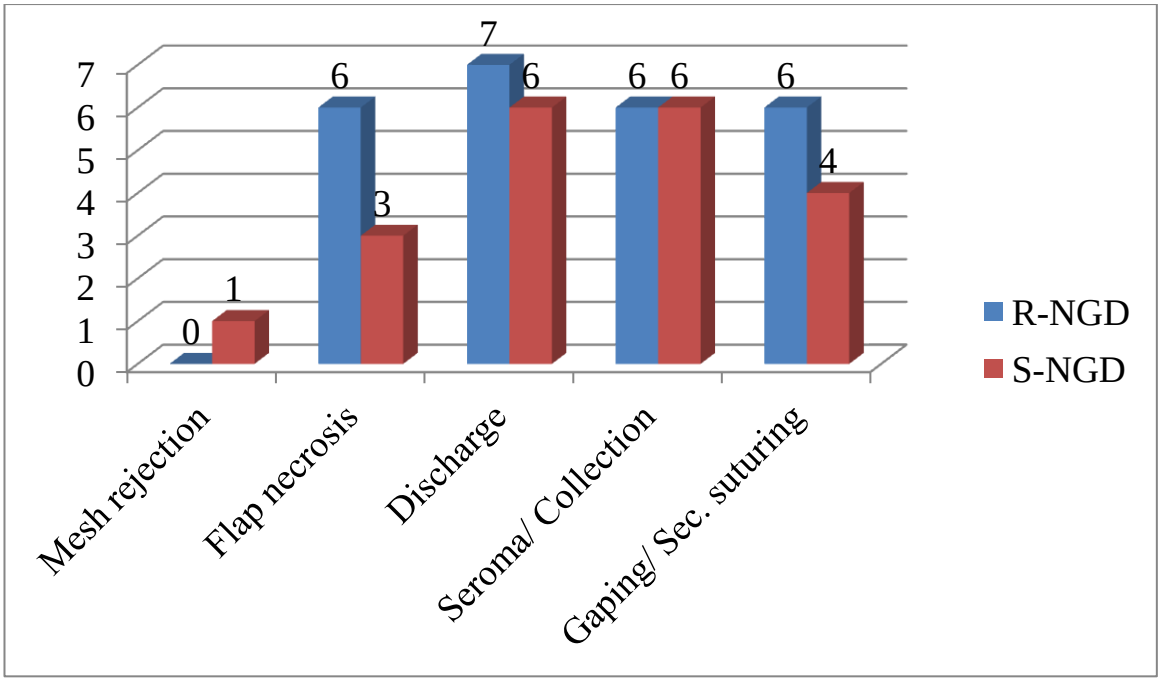




The above graph shows that post-operative respiratory complications were common among the R-NGD group. Nausea, hiccups and sore throat were also common among the R-NGD group. Vomiting seemed to favour routine decompression. In fact, one of the patients in the S-NGD group had to be decompressed with nasogastric tube on her 4th POD. It was due to persistent vomiting and abdominal distension, which was later, found to be due to paralytic ileus due to hypokalaemia. But whether paralytic ileus was secondary to hypokalaemia or hypokalaemia occurred secondary due to persistent vomiting could not be identified.

Wound related complications:

The difference in both the groups with respect to the wound related events were compared.



The above graph shows that there was no significant change in the wound related complications, except the flap necrosis and the consequent, wound gaping and secondary suturing, which was more common among the R-NGD group. Considering this to be due to the technical failure in raising the flaps, it was found that there was no change in the wound complications in both the groups.

Recurrence:

In both the groups, one patient had recurrence of their condition. Both these patients belonged to the set of patients, who had at least any of the above mentioned wound related complication.

Length of stay:

The average length of stay in both the group of patients was 14.5 days and 12.10 days among R-NGD and S-NGD group respectively. As

the flap necrosis and consequent, wound gaping and secondary suturing was more common among the R-NGD group of patients, and also due to the fact that flap necrosis occurred due to technical failure, not taking them into consideration for the length of stay calculation in both the group of patients, the average length of stay came down approximately to 10 days in both the groups, with 10.20 days and 9.60 days respectively for R-NGD and S-NGD group of patients.

DISCUSSION

DISCUSSION

The data observed was interpreted, tested for statistical significance and then compared with the standards in the existing literature of:

1) Bhaskaran et al. [37]
2) Antonie Hamy et al. [38]
3) Leber et al. [39]
4) Bashey & Cushieri et al. [40]
5) Nathan BN & Pain JA study [41]
6) COCHRANE study - Otchy 1995 [42]

When comparing the incidence of ventral hernias in this study with that of the Bhaskaran A et al, the following conclusion is arrived:

S. No.	Incidence of	Present study	BhaskaranA et al
1	Inguinal hernia	63 %	61 %
2	Incisional hernia	18 %	21 %
3	Umbilical & paraumbilical hernia	15 %	13 %
4	Epigastric hernia	3 %	4 %
5	Other types	1% (Spigelian)	1 % (Femoral)

Comparing other characteristics:

S. No.	Discrete variable	Present study	Bhaskaran et al
1	Age range	20 – 82	25 – 70
2	Peak incidence	31 – 40 (36 %)	31 – 40 (42 %)
3	Female %	79 %	88 %
4	Swelling & pain	21 %	18 %
5	Obs & Gyn surg.	86 %	78 %
6	GI surgeries	15 %	22 %

The incidence of the different types of hernia is more or less the same when compared to that of the other study. The other characteristic of the patients suffering from ventral hernia is also the same.

Comparing complications:

S. No.	Complications	Present study	Bhaskaran A et al	Antonie Hamy et al
1	Wound infection	17 %	2 %	14 %
2	Seroma	15 %	10 %	7 %
3	Mortality	Nil	Nil	0.6 %
4	Others	Nil	2 % (DVT)	Nil
5	Recurrence	2 %	Nil	3 %
6	No p/o complications	66 %	86 %	N. A.

The wound infection rates were high in our study, overall, in both the groups. This is in addition to the flap necrosis, which occurred in the present study. This was neglected assuming that flap necrosis happened due to technical error, while raising the subcutaneous flaps.

Post-operative ileus:

The below comparison shows that post-operative ileus is not a significant factor with the selective naso-gastric decompression group.

Complication	Present study	Leber et al
P/O Ileus	3 %	8 %

Mean hospital stay: (by student t test)

Group	Mean/ S.D.
R-NGD	10.17/ 2.06
S-NGD	9.76/ 1.05

P = 0.3852 - **not statistically significant**

The mean hospital stay showed an insignificant increase in the R-NGD compared to that of the S-NGD.

Comparison of gastro-intestinal function: (by student t test)

S. No.	Variable	R-NGD (Mean/ S. D.)	S-NGD (Mean/ S. D.)	P value	Significant/ Not significant
1	Bowel sounds	2.33/ 0.71	1.10/ 0.84	0.0001	**Significant**
2	Flatus	2.33/ 0.71	1.63/ 0.70	0.0005	**Significant**
3	Stools	4.47/ 0.73	3.57/ 0.90	0.0001	**Significant**

The above comparison shows that the return of gastro-intestinal function was earlier in the S-NGD when compared to that of the R-NGD group, and this was assumed to be statistically significant.

Comparing the incidence of complications:

S. No.	Complication	Present study		Bashey & Cushieri et al.	
		R-NGD	S-NGD	R-NGD	S-NGD
1	Nausea	30 %	3 %	63 %	52 %
2	Sore throat	30 %	NIL	85 %	40 %
3	Hiccups	20 %	NIL	37 %	16 %

S. No.	Characteristics	Present study	Nathan BN & Pain JA study
1	Re-insertion of the tube	1 %	2 %
2	Mean duration of tube placement	2.33 days	3.4 days
3	Nausea	P = 0.0122	P < 0.05
4	Sore throat	P = 0.0019	P < 0.0001
5	Hiccups	P = 0.0237	N. A.

3, 4 & 5 are statistically significant

The above tables show that the complication of nausea, sore throat and hiccups were common in the R-NGD group than that in the S-NGD, contrary to what was thought of and for the reason for which naso-gastric decompression was used. This was also statistically significant.

Comparison of other complications with COCHRANE study: (by Fisher test)

The final table below shows that there was an earlier return of gastro-intestinal function and lesser pulmonary complications among the S-NGD. There was no significance in the incidence of the recurrence among both the groups. The same was true for the incidence of wound infections in both the groups.

S. No.	Characteristics	Present study	COCHRANE study
1	Earlier return of G.I. function in S-NGD	P = 0.0001 **(Significant)**	P < 0.00001 **(Significant)**
2	Pulmonary complications (S-NGD)	P = 0.0137 **(Significant)** Lesser in S-NGD	P = 0.09 **(Significant)**
3	Wound infections	P = 1 **(Not significant)**	P = 0.39 **(Significant) - more in R-NGD**
4	Recurrence	P = 1 **(Not significant)**	P = 0.09 **(Significant) - more in S-NGD**

CONCLUSION

CONCLUSION

From the above discussion, the following conclusions are arrived at:

*) There was an early return of gastro-intestinal function among the Selective - Nasogastric decompression group.

*) The duration of hospital stay was lesser in the S-NGD group, but this was not considered statistically significant.

*) Though the duration of follow-up was short in the present study, there was no significant difference in the incidence of recurrence among both the groups.

*) The post-operative ileus was not a significant factor in the S-NGD group, as contradictory to what was thought of and for the prevention of which, naso-gastric decompression was practised.

*) There was no significant difference in the incidence of wound infection in both the groups, except that there was an increase in the flap necrosis and its consequent secondary suturing among the R-NGD. This was assumed to be due to technical failure, while trying to raise the subcutaneous flaps. This factor was rejected as this could be a confounding factor, and would have given a wrong, biased report to that of the other group. Hence, this was not used in the statistic purpose.

*) Since, the immediate post-operative wound infection is an important and indirect cause of the recurrence, and as this study has a short follow-up period, no significant difference in the wound infection in both the groups means that there would be no difference in the recurrence of the ventral hernia, after the repair.

*) This also proves that early onset of oral feeding, as advocated in the S-NGD group of patients, results in the early resumption of the activity of the gastro-intestinal function.

*) There was also an increase in the incidence of complications associated with naso-gastric decompression in R-NGD group of patients, such as sore throat, nausea and hiccups.

*) From the present study, only one patient among the 30 S-NGD group of patients required re-insertion of the naso-gastric tube, which means that about 97 % of patients could be safely spared from the frightful experience associated with the naso-gastric tube insertion and decompression, if routine usage is followed.

Finally, it is concluded that routine usage of naso-gastric tube decompression can be safely avoided, as it serves no intended purpose, and at the same time results in more complications.

LIMITATION:

The main limitation of this study is a short follow-up, which will not give the exact incidence of recurrence, particularly the late recurrence.

ANNEXURES

BIBLIOGRAPHY

1 Stephenson BM. Complications of open groin hernia repairs. Surg Clin North Am 2003;83:1255-78.

2 Best C. Caring for the patient with a nasogastric tube. Nurs Stand 2005;20:59-65.

3 Williams TA, Leslie GD. A review of the nursing care of nasogastric tube in ill adults. Intensive Crit Care Nurs 2004;20:330-43.

4 Philips N. Nasogastric tubes: a historical context. Medsurg Nurs 2006;15:84-8.

5 Koukouras D, Mastronikolis NS, Tzoracoleftherakis E, Angelopoulou E, Kalfarentzos F, Androulakis J. The role of nasogastric tube after elective abdominal surgery. Clin Ter 2001;152:241-4.

6 Cutillo G, Maneschi F, Franchi M, Giannice R, Scambia G, Benedetti-Panici P. Early feeding compared with nasogastric decompression after major oncologic gynecologic surgery: a randomized study. Obstet Gynecol 1999;93:41-5.

7 Cheadle WG, Vitale GC, Mackie CR, Cuschieri A. Prophylactic nasogastric decompression: a prospective study of its requirement and the influence of cimetidine in 200 patients. Ann Surg 1985;202:361-6.

8 Jones DB. Master techniques in surgery: hernia surgery. Philadelphia (PA): Lippincott Williams & Wilkins; 2013. P. xiii.

9 Parekh JN, Shah DB, Thakore AB. Incisional hernia: A study of 76 cases.

Int J Surg 1998 Feb-Mar; 49-53.

10 Burger JWA, Lange JF, Halm JA, Kleirensink GJ, Jeekel H. Incisional Hernia: Early Complication of Abdominal Surgery. World J Surg 2005;29:1608-13.

11 Fitzgibbons RJ, Greenburg AG, editors. Nyhus and Condon's hernia. Philadelphia (PA): Lippincott Williams & Wilkins; 2002. P. 3-8.

12 Sugerman HJ, Kellum JM, Reines HD, et al. Greater risk of incisional hernia with morbidly obese than steroid-dependent patients and low recurrence with prefascial polypropylene mesh. Am J Surg 1996;171:80-4.

13 Sorensen LT, Hemmingsen UB, Kirkeby LT, et al. Smoking is a risk factor for incisional hernia. Arch Surg 2005;140:119-23.

14 Guillou PJ, Hall TJ, Donaldson DR, et al. Vertical abdominal incisions--a choice? Br J Surg 1980;67:395-9.

15 Regnard JF, Hay JM, Rea S, et al. Ventral incisional hernias: incidence, date of recurrence, localization and risk factors. Ital J Surg Sci 1988;18:259-65.

16 Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies. Br Med J (Clin Res Ed) 1982;284:931-3.

17 Israelsson LA, Jonsson T. Suture length to wound length ratio and healing of midline laparotomy incisions. Br J Surg 1993;80:1284-6.

18 van ’t Riet M, Steyerberg EW, Nellensteyn J, et al. Meta-analysis of techniques for closure of midline abdominal incisions. Br J Surg 2002;89:1350-6.

19 Israelsson LA, Jonsson T. Incisional hernia after midline laparotomy: a prospective study. Eur J Surg 1996;162:125-9.

20 Santora TA, Roslyn JJ. Incisional hernia. Surg Clin North Am 1993;73:557-70.

21 Eisner L, Harder F. Incisional hernias. Chirurg 1997;68:304-9.

22 Waldhausen JH, Davies L. Pediatric postoperative abdominal wound dehiscence: transverse versus vertical incisions. J Am Coll Surg 2000;190:688-91.

23 Cox PJ, Ausobsky JR, Ellis H, et al. Towards no incisional hernias: lateral paramedian versus midline incisions. J R Soc Med 1986;79:711-2.

24 Jones KB, Jr. The left subcostal incision revisited. Obes Surg 1998;8:225-8.

25 Kendall SW, Brennan TG, Guillou PJ. Suture length to wound length ratio and the integrity of midline and lateral paramedian incisions. Br J Surg 1991;78:705-7.

26 Donaldson DR, Hegarty JH, Brennan TG, et al. The lateral paramedian incision-experience with 850 cases. Br J Surg 1982;69:630-2.

27 Grantcharov TP, Rosenberg J. Vertical compared with transverse incisions in abdominal surgery. Eur J Surg 2001;167:260-7.

28 Manninen MJ, Lavonius M, Perhoniemi VJ. Results of incisional hernia repair. A retrospective study of 172 unselected hernioplasties. Eur J Surg 1991;157:29-31.

29 Read RC, Yoder G. Recent trends in the management of incisional herniation. Arch Surg 1989;124:485-8.

30 Sanders DL, Kingsnorth AN. The modern management of incisional hernias BMJ 2012; 344:e2843.

31 Luijendijk RW, Hop WC, van den Tol MP, et al. A comparison of suture repair with mesh repair for incisional hernia. N Engl J Med 2000;343:392-8.

32 Schumpelick V, Conze J, Klinge U. Preperitoneal mesh-plasty in incisional hernia repair. A comparative retrospective study of 272 operated incisional hernias. Chirurg 1996;67:1028-35.

33 de Vries Reilingh TS, van Goor H, Rosman C, et al. “Components separation technique” for the repair of large abdominal wall hernias. J Am Coll Surg 2003;196:32-7.

34 Rea R, Falco P, Izzo D, Leongito M, Amato B BMC Surg.2012;12(Suppl 1):S33.

35 Gillion JF, Begin GF, Marecos C, et al. Expanded polytetrafluoroethylene patches used in the intraperitoneal or extraperitoneal position for repair of incisional hernias of the anterolateral abdominal wall. Am J Surg 1997;174:16-9.

36 Schumpelick V, Klinge U, Welty G, et al. Meshes within the abdominal wall. Chirurg 1999;70:876-87.

37 Bhaskaran A, Singh J, Basvarajappa M, Kodliwadmath H. Mangement of incisional hernia by preperitoneal mesh repair: A prospective study in rural population J Clin Biomed Sci 2011;1:115-21.

38 Hamy A, Pessaux P, Tephanie S, Radriamananjo S, et al. Surgical treatment of large incisional herniaby an intraperitoneal Dacron meshand an aponeurotic graft. J Am Coll Surg 2003;196:531-34.

39 Geoffrey EL, Jane LG, Albert IA, Reed WP. Long term complications associated with prosthetic repair of incisional hernia. Arch Surg 1998;133:378-82.

40 Bashey AA, Cuschieri A. Patient comfort after upper abdominal surgery. J R Coll Surg Edinb 1984;30:97-100.

41 Nathan BM, Pain JA. Nasogastric suction after elective abdominal surgery: a randomized study. Ann R Coll Surg Engl 1991;73:291-94.

42 Otchy DP, Wolff BG, van Heerden JA, Ilstrup DM, Weaver AL, Winter LD. Does the avoidance of nasogastric decompression following elective abdominal colorectal surgery affect the incidence of incisional hernia. Dis. Colon & Rectum 1995;38:604-8.

PROTOCOL FOR THESIS

A STUDY ON THE ROLE OF NASO-GASTRIC DECOMPRESSION IN PATIENTS UNDERGOING ELECTIVE OPEN ABDOMINAL WALL HERNIA REPAIR WITH MESH

Name: Age & Sex: IP No:

BMI:

Diagnosis:

Procedure: with/ without NGD ↓

DOS: DOD:

Pre-operative criteria:

1) Hb level (at the time of assessment) -

2) Abdominal Girth (just before shifting the pt. to OT) -

3) Saturation (just before shifting the pt. to OT) -

4) Glycemic control -

Per-operative saturation:

Post-operative criteria:

1) Saturation - At immediate post-operative period:

I POD: II - V POD (ave):

2) Abdominal girth - 6 hrs after surgery: I POD:

II POD: III POD: IV POD: V POD:

3) Hb level (after surgery):

4) Glycemic control:

5) Electrolytes level (imbalance if any in P/O period):

6) Symptoms:

Respiratory distress / Nausea / Vomiting / Abdominal pain / Abdominal distension / Fever / Others (if any)

7)Signs:

Induration / Wound soakage / Pus discharge / Wound gaping / Burst abdomen / Others (if Any) 8) BS heard on:

Started: Sips of fluids on:

9) Patient passed flatus on: Liquid feeds on:

10) Patient passed stools on: Soft solid diet on:

Normal diet on:

11) DT Nil/ Negligible on:

12) DT removed on:

13) Suture removal on:

14) Duration of stay in the hospital during the post-operative period:

15) Any complications after discharge (on follow-up):

KEY TO MASTER CHART

BMI	Body mass index
Diag.	Diagnosis
IH	Incisional Hernia
UH	Umbilical Hernia
PUH	Para-umbilical Hernia
EH	Epigastric Hernia
DR	Diastasis of recti
SH	Spigelian Hernia
LPST	Laparoscopic Port Site Hernia
PTVH	Post Traumatic Ventral Hernia
BA	Bronchial Asthma
Ca	Carcinoma
DM	Diabetes Mellitus
SHT	Systemic Hypertension
RA	Rheumatoid Arthritis
ASD	Atrial Septal Defect

CVA	Cardio Vascular Accident
App	Appendectomy
Lap	Laparotomy
Chole	Cholecystectomy
Hyst	Hysterectomy
PS	Puerperal Sterilisation
LSCS	Lateral Segment Caesarean Section
R Hemi	Right Hemicolectomy
LC	Laparoscopic Cholecystectomy
Proce.	Procedure
1	Adhesiolysis
2	Umbilicectomy
3	Abdominoplasty
4	Cattle's repair
5	Omentectomy
6	Appendectomy
7	Total Abdominal Hysterectomy & Bilateral Salpingo Oophorectomy
O	Omentum

SB	Small Bowel
TC	Transverse colon with Mesocolon
I	Ileum
(cor)	Corrected
AG	Abdominal Girth
EI	Electrolyte Imbalance
K^+	Potassium
Satn.	Saturation
compl.	Complications
N	Nausea
V	Vomiting
F	Fever
ST	Sore Throat
H	Hiccups
RTI	Respiratory Tract Infection
D	Discharge
S	Seroma

FN	Flap Necrosis
MR	Mesh Rejection
R	Recurrence
PI	Paralytic Ileus
POD	Post-Operative Day
Eve	Evening on the day of surgery
SS	Secondary Suturing
SI	Secondary Intention
VAC	Vacuum Assisted Closure
MHS	Mean Hospital Stay
post-op	Post-operative period

ROUTINE NASOGASTRIC DECOMPRESSION (R-NGD) GROUP

S. No & Name	Age/ Sex	BMI (kg/m2)	Diag.	Co-morbid conditions	Previous surgery	Proce. done/ Anaes	Con-tent	NGD removed on	Pre-op Hb (gm/dl)/ AG (cm)		Post-op satn. (%)/ Hb (gm/dl)/ AG (ave cm)			EI	Other Compl.	Wound related compl.	Onset of GI function	Started orals (sips) on	DT removed on	Any II procedure done	MHS (post-op)
1) Mrs. Nayagam	50/ F	25.65	IH, UH	Anaemia	Lap	1,5/ ES	O	III POD	9.5 (cor)	74	99	9	74	-	N	-	III POD	III POD	VII POD	-	9
2) Mrs. Valliyammal	61/ F	24.67	IH, UH	Anaemia	Hyst	3,6/ S	O	III POD	9.2 (cor)	70	99	9	68	-	N, ST	FN	III POD	III POD	VII POD	SS	39
3) Mrs. Anusuya	52/ F	28.65	IH	SHT, Anaemia	PS	3,5/ S	O	II POD	9 (cor)	82	99	8.6	78	-	N	FN	II POD	III POD	VI POD	SS	35
4) Mrs. Kantha	57/ F	29.72	Large UH	-	-	2/ S	O, SB	II POD	9.8	76	99	9.5	73	-	H	-	II POD	III POD	IX POD	-	9
5) Mrs. Vimala	33/ F	25.51	IH, UH	-	LSCS, PS	3/ ES	SB	I POD	10	68	99	9.4	65	-	H	-	I POD	I POD	IV POD	-	8
6) Mrs. Manjula	63/ F	24.17	UH, DR	-	PS	1,3/ ES	O	I POD	9.8	70	99	9.5	68	-	RTI, N, ST	FN	I POD	II POD	III POD	SS	25
7) Mrs. Usha	52/ F	24.11	IH	-	LSCS (2)	1/ S	O	I POD	11.2	66	99	10.6	65	-	N	-	I POD	I POD	V POD	-	6
8) Mrs. Muthulakshmi	32/ F	26.57	IH	-	LSCS (2)	2,6/ ES	O	III POD	10.8	68	99	10.5	68	-	F	-	III POD	III POD	VII POD	-	9
9) Mrs. Murugeshwsai	40/ F	25.51	UH	-	-	S	O, SB	III POD	9	68	99	8.8	68	-	H	D	III POD	IV POD	XI POD	-	10

10) Mrs. Kanchammal	40/ F	25.39	UH	-	H/ O LSCS	S	O	II POD	9.8	70	99	9.5	68	-	-	D	II POD	II POD	VI POD	-	11
11) Mr. Kesavan	25/ M	28.35	PTVH	-	-	1,5/ S	O, TC	II POD	9.6	65	99	9.4	64	-	F	D	II POD	II POD	V POD	-	11
12) Mrs. Kanchana	29/F	27.75	IH	ASD operated	Hyst	3/ S	SB	II POD	9.5	72	99	9	68	-	-	S	II POD	III POD	VI POD	-	10
13) Mrs. Gandhimathy	49/ F	29.29	IH	DM, SHT	TAH/ BSO	3,5/ S	O	III POD	9.6	76	99	9.2	72	-	H	S	III POD	III POD	VI POD	-	13
14) Mrs. Elizabeth	32/ F	24.77	IH, UH, DR	-	LSCS	1,3,4/ ES	O	II POD	11	74	99	10.6	72	-	ST	-	II POD	II POD	VI POD	-	10
15) Mrs. Gomathy	35/ F	28.58	IH	-	LSCS	3/ S	O	III POD	10	71	99	9.8	68	-	RTI, N, V	-	III POD	IV POD	V POD	-	11
16) Mrs. Saroja	50/ F	23.43	IH, UH	-	LSCS	1,3/ S	O	III POD	9.5	79	99	9.2	75	-	ST	-	III POD	IV POD	V POD	-	7
17) Mrs. Manjula	32/ F	25.81	IH	-	LSCS	3/ S	TC	III POD	10	81	99	9.6	75	-	RTI, H	FN	III POD	III POD	III POD	SS	25
18) Mrs. Kantha	57/ F	23.38	PUH	DM, SHT	Hyst	1/ S	O, SB	II POD	11	80	99	10.6	78	-	ST	S	II POD	II POD	VI POD	-	9
19) Mrs. Krishnaveni	60/ F	24.22	IH	SHT, Hypothyroidism	Lap	1,3/ S	TC	III POD	10.2	68	99	10	65	-	RTI, N, H	FN	III POD	III POD	V POD	SS	36
20) Mrs. Parimala	45/ F	29.41	IH	DM	LSCS	1,3,5/ ES	O, TC	II POD	10.5	76	99	10.2	72	-	ST	-	II POD	II POD	III POD	-	9

21) Mrs. Chitra	30/F	29.41	IH	-	LSCS	3/ S	O	II POD	9.8	76	99	9.4	74	-	N	S, D	II POD	II POD	IV POD	-	12
22) Mrs. Ambujam	60/ F	25.71	Large UH	Hypothyroidism	LSCS	1,2/ S	TC	II POD	10.2	72	99	10	70	-	N	D	II POD	II POD	V POD	-	11
23) Mrs. Chandra	31/ F	26.95	IH		LSCS	1,5/ S	O	III POD	11.5	74	99	11	72	-	RTI	FN	III POD	III POD	VI POD	SS	26
24) Mrs. Malliga	60/ F	27.34	IH	DM, SHT	Hyst	3/ S	TC	II POD	10	65	99	9.8	65	-	-	-	II POD	II POD	IV POD	-	10
25) Mrs. Usha	30/ F	25.39	IH	-	LSCS, PS	3/ S	O	I POD	9.6	78	99	9.4	74	-	ST	-	I POD	I POD	III POD	-	8
26) Mrs. Krishnaveni	60/ F	26.47	UH	SHT	Hyst	S	O	III POD	9	84	99	8.6	80	-	RTI	S, D	III POD	III POD	VI POD	-	14
27) Mrs. Renuka Devi	45/ F	24.43	UH, EH	DM	LSCS, PS	3/ S	TC	II POD	9.5	78	99	9	75	-	ST	-	II POD	II POD	III POD	-	10
28) Mrs. Muniyammal	55/ F	29.78	IH	SHT	LSCS	1,3/ S	O	II POD	10.2	76	99	10	73	-	RTI	-	II POD	II POD	IV POD	-	11
29) Mrs. Shanthi	37/ F	26.56	IH	Anaemia	Lap	3/ S	SB	III POD	9.5 (cor)	80	99	9.2	76	-	R	D, G	III POD	IV POD	V POD	Healing by SI	15
30) Mrs. Kaliyammal	30/ F	24.46	UH, EH	-	-	1/ S	O	III POD	10	76	99	9.6	74	-	ST	-	III POD	III POD	III POD	-	11

SELECTIVE NASOGASTRIC DECOMPRESSION (S-NGD) GROUP

S. No. & Name	Age/ Sex	BMI (kg/m2)	Diag.	Co-morbid conditions	Previous surgery	Proce. done/ Anaes	Con-tent	Pre-op Hb (gm/dl)/ AG (cm)		Post-op satn. (%)/ Hb (gm/dl)/ AG (ave cm)			EI	Other Compl.	Wound related compl.	Onset of GI function	Started orals (sips) on	DT removed on	Any II procedure done	MHS (post-op)
1) Mrs. Shanthi	37/ F	29.41	IH	Anemia, BA	App, Lap	1,2,3/ ES	TC, SB	9	84	99	8	80	-	RTI, F	D, G	I POD	I POD	VI POD	VAC, SS	30
2) Mrs. Kaliyammal	31/ F	25.71	IH	-	PS, Lap	1,3/ ES	SB	9.5	78	99	9	75	-	V, R	-	II POD	I POD	V POD	-	10
3) Mrs. Nargis Banu	35/ F	26.95	IH, UH, DR	-	LSCS (2)	3,4/ ES	O, SB	10.2	76	99	10	73	-	V	S	I POD	eve	VIII POD	-	11
4) Mrs. Rosemary	40/ F	27.34	MIH	BA	LSCS, PS	3,6/ ES	O, SB	9.8	80	99	9.4	76	-	-	-	I POD	eve	VI POD	-	9
5) Mrs. Jayanthi	35/ F	25.39	PUH	-	H/O LSCS	2,3/ ES	O	10	76	99	9.6	74	-	-	-	I POD	eve	IX POD	-	9
6) Mrs. Saraswathy	63/ F	23.43	IH, DR	Anaemia, Ca colon	R Hemi	1,3/ ES	O, SB	9 (cor)	76	99	8.8	74	-	-	-	eve	eve	VIII POD	-	9
7) Mrs. Savithri	54/ F	25.81	PUH	DM, SHT, RA	H/O PS	1,3/ ES	O	10.2	72	99	10	70	-	-	-	eve	eve	VIII POD	-	10
8) Mrs. Sathya	25/ F	23.38	IH, UH	-	PS	3/ S	O	11.5	74	99	11	72	-	-	D, S	eve	eve	IV POD	-	11
9) Mrs. Kamala	58/ F	24.22	Large IH	SHT	PS, Hyst	1/ S	O, I, TC	10	65	99	9.8	65	K+ low	V, PI	-	I POD	eve	IV POD	Insertion of NG tube	8

10) Mrs. Gomathy	62/ F	29.41	IH, EH	-	LSCS, PS	3/ S	O, SB	9.6	78	99	9.4	74	-	-	-	I POD	eve	V POD	-	11
11) Mrs. Kalavathy	41/ F	28.35	IH, DR	Hepatitis B	Hyst	1,3,4,5/ ES	O, BS	10	79	99	9.6	75	-	-	-	I POD	eve	VIII POD	-	10
12) Mrs. Aziza Begum	50/ F	27.75	IH, FU	SHT, DM, BA	-	3,7/ ES	O	11	81	99	10.6	75	-	Fever	MR	I POD	eve	IV POD	Mesh removal/ SS	30
13) Mrs. Samsath	48/ F	29.29	IH, UH	DM	LSCS, PS	3/ ES	O	10.2	80	99	10	78	-	-	-	I POD	I POD	IV POD	-	10
14)Mrs. Rita	35/ F	24.77	PUH	Paralytic polio	App, PS	2,5/ ES	O	10.5	68	99	10.2	65	-	N, V	D, S	II POD	I POD	VI POD	-	11
15) Mrs. Pankajam	68/ F	28.58	IH	DM	Hyst	1,3/ S	O, SB	9.8	76	99	9.4	72	-	-	-	I POD	eve	III POD	-	8
16) Mrs. Amala	20/ F	24.17	IH, UH	-	LSCS	S	O	9.5	65	99	9	64	-	F	FN	I POD	eve	III POD	SS	28
17) Mrs. Durga	28/ F	24.11	PUH	-	H/O PS	2,3/ ES	O	9.6	72	99	9.2	72	-	-	-	eve	eve	V POD	-	8
18) Mrs. Shanthi	30/ F	26.57	PUH	-	-	3/ S	O	11	76	99	10.6	73	-	-	-	eve	eve	IV POD	-	11
19) Mrs. Mahalakshmi	32/ F	25.51	IH	-	LSCS	1,3,5/ S	O	10	74	99	9.8	72	-	-	-	II POD	eve	V POD	-	8
20) Mrs. Kanniyammal	52/ F	25.39	IH	-	LSCS	1,3,4,5/ ES	O, SB	9.5	71	99	9.2	68	-	-	-	I POD	eve	VI POD	-	10

21) Mrs. Anusuya	32/ F	25.65	UH	-	H/O PS	2,3/ S	O	11.2	70	99	10.6	66	-	-	-	I POD	eve	IV POD	-	9
22) Mrs. Jeyaseeli	32/ F	24.67	UH, EH	BA	H/O PS	1/ S	O	10.8	66	99	10.5	66	-	-	S	eve	eve	VI POD	-	10
23) Mrs. Lila bai	80/ F	28.65	Large UH	DM, SHT	-	1,2,3/ ES	O, SB, TC	9	84	99	8.8	80	-	F	FN	II POD	I POD	VII POD	SS	26
24) Mr. Velankanni	48/ M	29.72	IH	SHT, old CVA	Chole	GA (S-NGD to I POD)	O, SB, TC	9.8	78	99	9.5	75	-	-	-	III POD	III POD	V POD	-	11
25) Mrs. Kowsar Banu	35/ F	25.51	LPSH	DM, SHT	LC	S	O, SB	9.6	70	99	9.4	70	-	-	D, S	eve	eve	III POD	-	10
26) Mrs. Selvi	35/ F	26.47	PUH	BA	H/O PS	2,3/ S	O	10.2	74	99	10	72	-	-	D	I POD	eve	IV POD	-	10
27) Mrs. Lakshmi	35/ F	24.43	SH	DM	H/O PS	1/ S	O	10	70	99	10	70	-	-	-	I POD	I POD	V POD	-	9
28) Mrs. Kumari	55/ F	29.78	UH, EH	DM, BA	LSCS, Hyst	1,3/ ES	O	9.8	82	99	9.5	78	-	-	S	III POD	I POD	VII POD	-	10
29) Mrs. Sokkammal	65/ F	26.56	IH	-	H/O PS	1,3/ S	O	10	76	99	9.4	73	-	-	D	II POD	eve	V POD	-	11
30) Mr. Elanji	52/ M	24.46	IH	-	Lap	1/ S	O, SB	9.8	68	99	9.5	68	-	-	-	II POD	eve	IV POD	-	8

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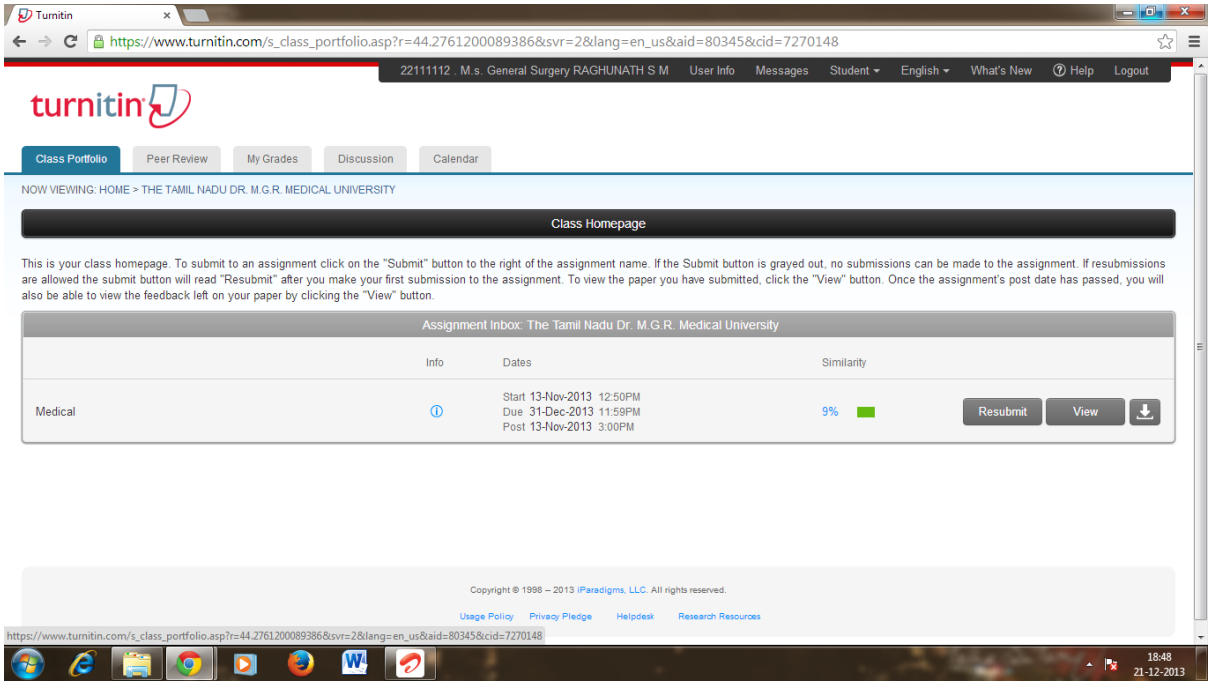
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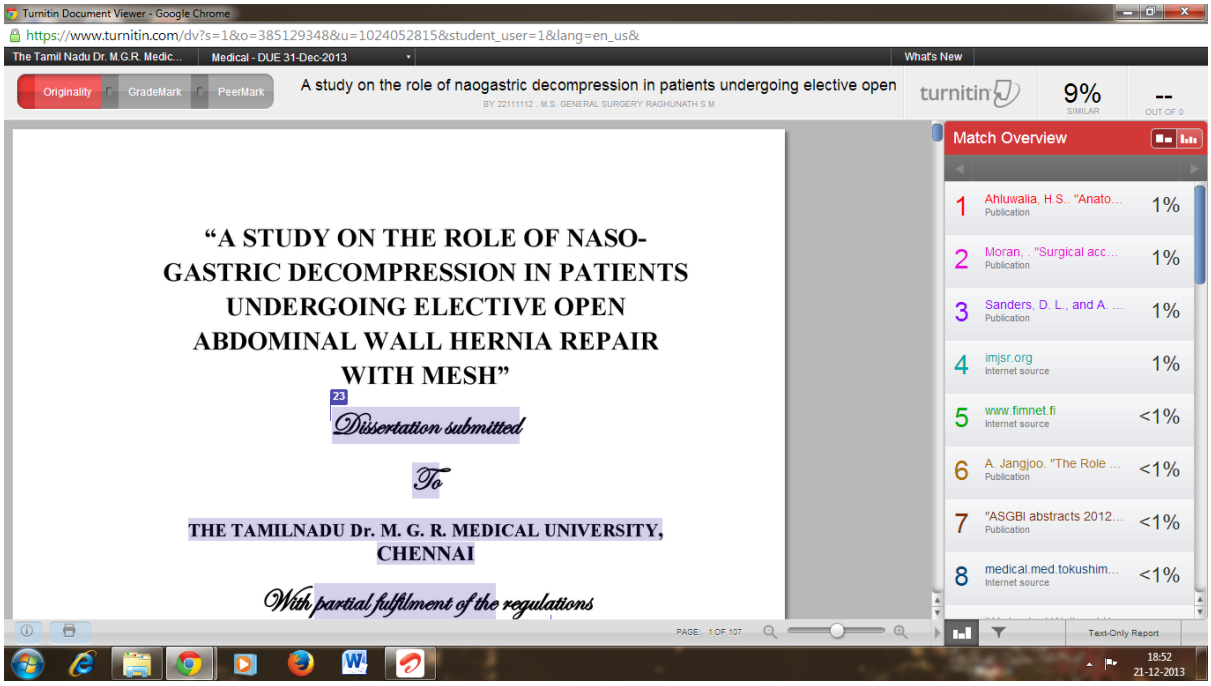
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