

LICHTENSTEIN REPAIR OF INGUINAL HERNIA: NEW MODALITIES FOR MESH FIXATION; THE USE OF TISSUE ADHESIVE GLUE (HISTOACRYL; N BUTYL 2 CYNOACRYLATE) TO FIX THE MESH .

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The use of tissue adhesive glue to fix the mesh in inguinal hernia repair is an alternative for sutures and clips. One of these tissue adhesive is the histoacryl (n butyle (2 cyanoacrylate). In our study 59 male patients whom they complain of having 75 inguinal hernia (43 unilateral and 32 bilateral) were recruited for such technique. This research focuses on the evaluation of this method. The procedure performed was the standard Liechtenstein -tension free repair for all inguinal hernias. The preoperative preparation, intraoperative time, use of antibiotics, use of post operative painkillers, patient satisfaction and return to work and the early and late complications were analyzed.

Conclusion: most surgeons are still doing the traditional and usual method of Mesh fixation in inguinal hernia repair. This new technique is recommended for the benefits found in our study.

Key words: cyanoacrylate , inguinal hernia surgical repair, tissue adhesive.

INTRODUCTION

Inguinal Hernia repair is the commonest procedure been done among general surgeons. Over the past four decades mesh has been introduced and became widely used to repair inguinal hernia ⁽¹⁾. In the last decade the description of Liechtenstein tension free onlay repair using polypropylene mesh is becoming the standerd acceptable tension free repair (RCS1992).

The present work is based on pascal's low that the mesh is kept against the abdominal wall by the intra abdominal pressure i.e. the very force to produce the hernia is exploited to repair it ⁽²⁾ i.e. no need to fix the mesh with stitshes.

The use of glue in tension free mesh fixation has been tried before. Such type Histoacryle was tried in Mesh fixation⁽³⁾. This type of glue has been used widely in surgery.

The main goal to achive is to evaluate the use of glue as an effective method for mesh fixation and to minimize the intraoperative time for fixation , and minimise the use of antibiotics and pain killers for post operative infection prophylaxis and pain control respectively .By doing this we will minimise post operative complication, and hospital stay and the return to normal physical activities very soon and decreasing the coast.

PATIENTS AND METHODS

59 male patients presented to out patient department with 75 inguinal hernia of one consultant in this surgical unit.

(Table 1) and (Table 2) show the age incidence and the medical problems and the site and type of the hernia.

Table (1): Inguinal hernias : patients; site, type and history

<i>Hernia</i>	<i>Pt's</i>	<i>Rt.</i>	<i>Lt.</i>	<i>Direct(New)</i>	<i>Direct(Recurrent)</i>	<i>Indirect (New)</i>
Unilateral	43	32	11	14	05	29
Bilateral	16	16	16	15	09	17
Total	59	48	27	29	14	46

Rt.: right, Lt.: left

Table (2): Inguinal hernias : Patients; Age incidence and the medical problems.

<i>Age incidence</i>	<i>Pts.</i>	<i>Unilat.</i>	<i>Bilat.</i>	<i>COAD</i>	<i>BHP</i>	<i>IHD</i>	<i>Constipation</i>
0-20	05	05	00	01	00	00	04
21-40	11	10	01	03	01	02	05
41-60	19	13	06	05	04	05	05
61-80	24	15	09	16	04	01	03
Total	59	43	16	25	09	08	17

COAD: chronic obstructive airway disease, BHP: benign prostatic hypertrophy, IHD: ischemic heart disease.

All patients were admitted to hospital on the same day of operation. They have been assessed in the preoperative out patient clinic. Those who presented with complicated hernia (ASA5) to the Accident and Emergency department were excluded from this study. All patients were seen in the preoperative assessment clinic had a full history hernia sheet, clinical examination, with particular interest to the etiological factor of the hernia, smoking, heavy weight lifting and the nature of patients' work. A blood sample for FBC, PT, U&Es and LFT's with a Chest X-Ray were performed. The abdominal and pelvic U/s and ECG were done when indicated. Those who presented with obstructive airway disease or anti hypertension and diuretics had further assessments of their Cardiovascular and Chest Function and were advised to stop smoking for at least two weeks before surgery. Those who were on oral anticoagulants or anti platelets were advised to stop taking them for at least 10 days before surg..Those who presented with increase intra abdominal pressure due to chronic constipation and Benign hypertrophied prostate enlargement were thoroughly dealt with before operation. All patients were listed for Lichtenstein-tension free Mesh Hernia Repair. The mesh used is (macroporus Knitted monofilament polypropylene mesh Prolene Mesh clear* 10 cm x 15 cm piece Ethicon L.T.D. U.K.) This type was chosen as it is tolerant for bending and flex stress. The procedure performed was the Lichtenstein technique described. All patients had a shower the night before the operation. The operative area were shaved immediately before surgery. The pre operative anesthetic assessment of the patients was shown on (Table 3).

Table(3): Inguinal Hernias: patients preanesthetic assessment

<i>Age incidence</i>	<i>ASA1</i>	<i>ASA2</i>	<i>ASA3</i>	<i>ASA4</i>	<i>ASA5</i>
0-20	05	04	01	00	00
21-40	11	07	04	00	00
41-60	19	13	01	05	00
61-80	24	09	03	11	01
Total	59	33	09	16	01

ASA;American society of anesthesia, ASA(5) ; were not included in this method.

Regional nerve blocks were not used. Local anesthesia infiltration used consisted of a mixture of equal amounts of 2% Lignocain =10 ml and 0.5% Buvacain (Marcain)=10 ml and diluted in equal amounts of normal saline 0.9 =20 ml . 40 mls in total and this was prepared and given by the surgeon.

Tension free Repair

A Transverse incision was made in the lower lumbar skin crease for all unilateral cases. (Fig 1) The same incision were also used for the recurrent cases.

For bilateral cases two separate right and left incisions were made at the beginning for both sides starting with right and followed by the left to guarantee a cosmetic scaring.

After exploration and identification of the sac herniotomy and herniorraphy were performed using (proline 1) Ethicon. Hernioplasty described⁽³⁾ were performed in all patients (Fig 2).

On laying a piece of 7.5 cms x 10 cms mesh over the posterior wall floor after fashioning it and making a slit where the internal ring allowing the emergence of the cord. By covering the pubic tubercle and encircling the cord the adhesive (Histoacryl® B Braun Surgical AG. GMBH, Pack of 5 Vials 0.5 ml REF 0105 0052, CE 0123) were applied via the original tube in a dropper-like technique described⁽⁴⁾ via a black needle. Application was done described⁽⁵⁾ starting with securing the mesh medially to the lacuner ligament and then proceeds laterally along the poupert'sligmant. The superior edge is secured in a similar way to the rectues sheath and conjoined muscle and tendon above also the snug fit around the cord and laterally. Application using this technique (Fig 3,4) allow the spreading of the adhesive in a precise fine film and predictable manner to reduce the amount used and to apply it in equal amounts all over the edges with very thin film. The time allowed for the glue to fix was 30-60 seconds. The amount used were around 0.5 ml that contains 0.5 g. for each Mesh. No Intra-or postoperative antibiotics were used at this study. Closure of the external oblique apponeorosis, scarpas fascia and the skin routinely using the remaining amount of glue in the tube for each hernia.

RESULTS

The general, local and regional anesthesia (spinal, epidural and direct infiltration) were used are shown on (Table 4).

Table(4):Inguinal hernia patients type of anesthesia

	Unilateral	Bilateral	Total
General Anesthesia	05	06	11
Spinal	20	05	25
Spinal/Epidural	06	02	08
Local infiltration	12	03	15
Total	43	16	59

The intraoperative usage time is shown in (Table 5) about 38 % of cases were done in less than 30 minuets those are the unilateral hernia patients and only 5 % of cases took more than 1 hour the remaining 34 % from the unilateral hernia patients took between 30-60 minutes for the procedure i.e. the recurrent patients . 24% from the bilateral hernia patinets were done on the same time as well. This is shown on (Table 5).

Table (5): inguinal hernia patients; intraoperative repair time in minutes

OT Time	Unilateral	Bilateral
<30 min	22	00
31-40	09	01
41-50	07	08
51-60	04	05
>60 min	01	02
Total	43	16

There were no recorded of needle stick injury to all operating staff; the surgeon, assistant and the scrub nursing staff. The anesthetist monitored this. All patients were allowed oral fluid after full recovery. No antibiotics were given postoperative except for complicated cases. All patients were allowed painkillers either Double: Paracetamol 2 g /day and Ibrubrufen 1.2 g/day. or single; Tramal 50-100 mg/day only. This is shown in (Table 6)

Table(6): Inguinal hernia patients; post operative pain killers (after discharge)

Post Op Pain	Unilateral		Bilateral	
	Single	Double	Single	Double
Tablets				
<3 days	08	00	00	00
<1 week	19	11	08	01
>1 week	00	05	01	06
Total	27	16	12	04

*Single: Tramal 50-100 mg/day

*Double: both paracetamol 2mg/day & ibrubrufen 1.2mg/day.

Most patients (44 %) who had local infiltration and General anesthesia were allowed home in the same day of the procedure after passing urine. The bilateral cases were allowed home the same (15%) or next day (10%) depending on their tolerance to pain. Patients who had spinal and epidural anesthesia were allowed to stay over night under observation i.e. maximum 2 days hospital stay (54%) shown on (Table 7)

Table(7): Inguinal hernia patients ; postoperative hospital stay

Hospital stay/night	Unilateral	Bilateral
<1	17	09
1-2	20	05
2	06	01
>3	0	01
Total	43	16

All patients were seen in the OPD by the same surgeon after 1 week , 4 weeks, 12 weeks, 6 months and 1 year.

Complications

All complications occurred were recorded and they were not related to the new technique .

Most of the complications were in recurrent cases (14patients 23 hernias) The intraoperative and postoperative, The local and systemic , the early and late are shown on Table (8a &b)

Intraoperative cord structurcs injuery were recorded in 4 cases all were recurrent testicular artery were cut 1 and the vas were cut 3 and repaired at the same sitting.

Table(8a): Inguinal hernia patients Post operative local complication

Local	Unilateral	Bilateral
Wound oedema	01	00
Hematoma	02	01
Penile/Scrotum Oed	00	11
Penil/Scrotum Hem	00	00
Wound infection	00	00
Nerve Pareses	01	01
Ischeamic orchities	00	00

Table(8b): Inguinal hernia patients; Post operative general complications

General	Unilateral	Bilateral
Chest infection	02	03
DVT(PE)	00	00
Constipation	00	00
Retention *	00	01
Fever	00	00
Ischemic attack	00	00

*This patient remain in hospital and TURP were performed before discharge.

Oedema was noticed in the penis and scrotum. It was recorded in eleven patients of bilateral (1st time) inguinal hernia. It subsided within the 4th week by using scrotal support and NSAID Ibruprofen (400 mg Bd/day). Seroma in the wound were recorded in four patients all recurrent. It was noticed in the first week on removal of dressing. There were no temperature or any signs of infection. Patients were advised to use of antiseptic solution during bathing and were also given 500 mg cephalexin oral TDS for five days. Wound hematoma was found only in one recurrent unilateral patient. No wound infection were recorded in our study. Urinary retention was managed conservatively in one patient. This patient needed to have TURP before discharge. No recorded death in our study. Dermatomal pareses were noticed in two recurrent patients. Chest infection was recorded in five patients. DVT and PE were not recorded in our study. No recorded problems concerning the use of the glue near by the femoral sheath as we were particularly looking at this site as we were concerned about this at the beginning of the study.

Follow up:

It was performed as we mentioned before All patients were seen in the OPD by the same surgeon after 1st week, 4th week, 12th week, 6th month and 1st year shown on (Table 9a)

Table(9a): Inguinal hernia patients Follow up -OPD examination.

Follow up	Unilateral	Bilateral
1 week	43	16
<1 month	39	13
1-3 months	34	11
3-6 months	29	09
<1 year	24	07
1- 2 years	15	05
< 3 years	04	03
Total Follow up	32	11
Lost Follow after 3y	11	05

1st week and 4th week were 96% follow up. Subsequently the mean follow up was 18 months (1 - 36 months) see (Fig 5,6,7).

Most patients regain their normal activities by the 3rd (60 %) and 4th (20%) week. The remaining (20%) were back to their normal physical daily activities and to work after that. This is shown on (Table 9 b)

Table(9b): Inguinal hernia patients Follow up - back to work

Back to work	Unilateral	Bilateral
Within 3 rd week	27	08
Within 4th week	09	03
After that	07	05
Total	43	16

Patients who were not satisfied was found in only 10% compared to 56% who were very happy with the procedure The remaining 34% were not happy due to the complications occurred. This is shown on (Table 9c)

Table (9c): Inguinal Hernia patients Follow up; Patient's satisfaction.

Patient satisfaction	Unilateral	Bilateral
Good/Happy	24	09
Fair/Unhappy	15	05
Poor/Unsatisfied	04	02
Total	43	16

No recurrence rate was noted and no death was recorded as we mentioned before.

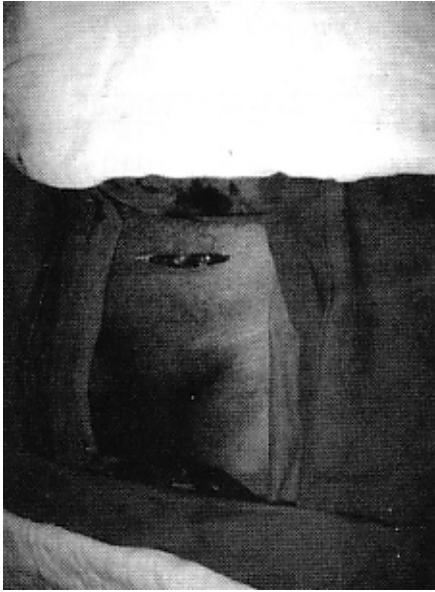


Fig.(1): Showed the transverse incision mode

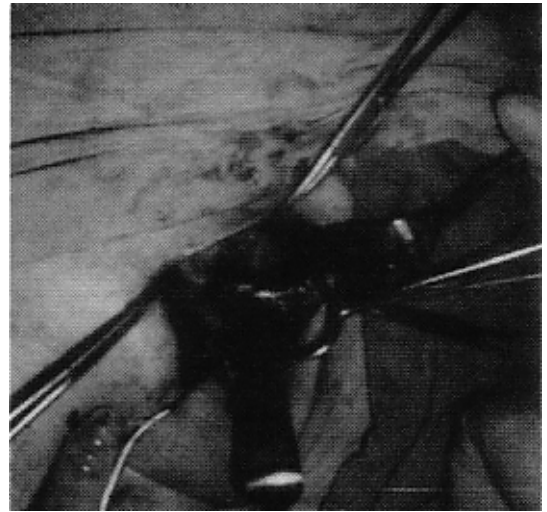


Fig.(2): Showed Mesh layed down on the fascia transvers soils.



Fig.(3): Application of glue to the mesh.

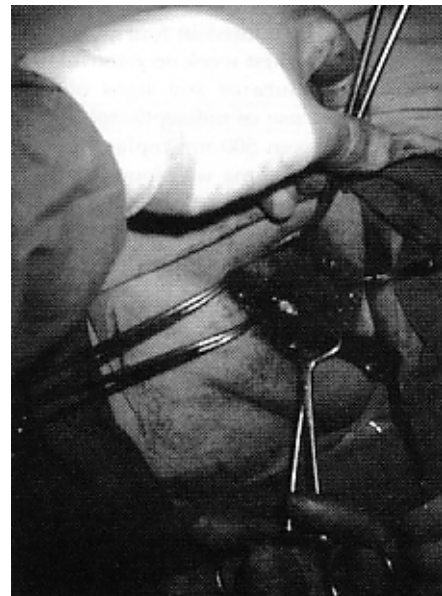


Fig.(4): After the glue was applied to the mesh.



Fig.(5): Patient # 33, 1 year follow up.



Fig.(6): Patient #19, 2 years follow up.



Fig.(7): Patient # 12 , 3 years follow up.

DISCUSSION

This study is representing the experience of such method by a single surgeon in both unilateral and bilateral hernia. The technique used for tension free hernia repair is widely used and accepted. (6),(7).

The standard method used for hernia fixation is by suturing or clipping. Even some surgeons they just lay on the mesh and leave it without any form of fixation particularly the laparoscopic approach but the open standardized method used the sutures and clips (8).

The application of the glue in fixation of mesh is still new and not widely known. It has been done before with human fibrin glue.(9) The different forms of tissue adhesive, like octyle cyanoacrylate (long chain) and n-butyl-2-cyanoacrylate (short chain) i.e. (histoacryl, indermil, krazy glue).

Glue is widely used in surgery and medicine. In the management of facial lacerations(10) and different length abdominal wounds(11), In the Full thickness skin grafts fixation was very much time saving and excellent cosmetic outcome (12). In closure of Gastrointestinal(13), enterocutaneous(14) fistulae and high risk intestinal anastomosis(15), In laparoscopic hernia repair(16), In sutureless pericardial patches fastened to myocardium with glue(17).

The use of Histoacryl® in mesh fixation was also done before in limited trial(3).

The size of the mesh used 7.5 cms x 10 cms was actually suitable irrespectively to the usual standard 15 cms x 10 cms (18). There was no recurrence in our study for 1-3 years follow up(2).

The local complications occurred concerning hernia itself was within the acceptable limits and was not related to the method of fixation.

The wound complications are non-avoided in hernia repair but being a single consultant it was controlled and actually this limited the wound complication to the minimum.

Scrotal and penile edema in the bilateral hernia repair is very common complication and inevitable and non avoidable in the open hernia repair.

The cord structure injury was recorded only in recurrent cases in our study due to high incidence and high risk of such injury in the recurrent cases. The vas and nerve injury is attributed to the recurrence and the dissection in the field before , which occurred in two patients.

The general complication due to chest infection where actually those patients who had COAD and bad lung functions from the start.

The use of the glue has shown no complications to the bone or to soft tissue structures(19). There were no sign of infection or inflammation or increase in temperature. There were no injury to the vessels either veins or arteries as there were no sign of ischemia or arterial insufficiency or recorded DVT (20).

The hospital stay, the use of painkillers, the return to work and the patient satisfaction were analyzed. The patients were shown to have shorter hospital period, less amount of post operative pain killers after discharge and the return to work is very rapid compared to other studies.

In our study the Glue we used decreased the intraoperative time significantly(21). Single (1st time) inguinal hernia repair took mean 23 minutes (18-47 minutes). Bilateral (1st time) inguinal hernia repair took mean 59 minutes (49-88 minutes).

Also no antibiotics were used in this study(22). Only those who had surgical wound complications i.e. who developed seroma were given for fear of secondary infection.

The pain visual analogue score were not performed, as most of our patient did not understand it. The only estimation was the use of pain killers and around 78% of our patient stopped one form of the oral pain killer used by the 4th day post operative and the other form by the 1st week post operative. Only six patients kept using it till the 2nd week post operative.

The normal physical activities(21) (walking at home and climbing stairs) were done safely with no help by the 1st week post operative. All went back to work on the 3rd - 4th week.

CONCLUSION

This method of fixation is safe cheap and of significant value provided it is available.

The histopathological study for knowing the exact what is the effect of the glue on the tissue should be analyzed further on experimental base before widely applying this technique.

The use of the glue decreased the hospital intraoperative timing and the hospital stay and the use of post operative painkillers. The return to work early

irrespectively that it was the lichtenstien tension free mesh and it is also less traumatic to the tissues and being sterile and cytotoxic decrease the use of antibiotics and also it decreased the risk of needle stick injury.

The traditional and usual methods of hernia fixation still been done but we could recommend the previous technique for its aforementioned benefits.

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