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A Prospective Comprehensive Study of Etiology and Analysis of Pathological Anatomy in Occurrence of Incisional Hernias.

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Abstract: *Major abdominal surgery developed rapidly during the later part of last century and with it, increased the incidence of post operative hernias. For more than 100 years, attempts have been made to develop successful methods for repairing them, but even in the best centres, the incidence of post operative hernias has been atleast 10 percent[(1)]. Sothe understanding of perfect pathological anatomy and etiology of Incisional hernia is the need of the hour for every surgeon. Our study discusses the essentials to be achieved during surgical process to prevent the magnitude of Incisional hernia.*

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I. Introduction

Major abdominal surgery developed rapidly during the later part of last century and with it, increased the incidence of post operative hernias. For more than 100 years, attempts have been made to develop successful methods fo repairing them, but even in the best centres, the incidence of post operative hernias has been atleast 10 percent[(1)]. Sothe understanding of perfect pathological anatomy and etiology of Incisional hernia is the need of the hour for every surgeon.

II. Aims and Objectives

(i) To study the etiological factors foroccurence of incisional hernia.
(ii) To study the pathological anatomy in occurrence of Incisional Hernias.

III. Materials and Methods

(1) Study design:- Prospective observational study
(2)- Study group:- Over 2 years, 100 patients who underwent Laparotomy and abdominal surgeries in General surgery department of Government Mohan kumaramangalam Medical College and Hospital, Salem were enrolled in our study.
(3)- Inclusion criteria:-
(a) Both males and females who underwent Laparotomy or abdominal surgeries
(b) Age between 15 and 70 years.
(4)- Exclusion criteria:-
(a) Not willing for study
(b) Incisional hernias
(5)- Study method Instituted

Complete detailed history taken about the present indication for surgery , comorbidities like Sepsis, Diabetes, hypertension, obesity, anemia, hypoproteinemia, COPD, chronic constipation and prostatism were looked into. Abdominal muscle tone was assessed for all patients. Post operative complications were recorded. Patients were regularly followed up after discharge once in every 2 months. 10% cases were followed up for more than 1 yearwith a maximum follow up period of 2 years, minimum period of follow up was 4 months in 13 cases.

IV. Results

(a) In our study of 100 cases, the indication for surgery was as follows

Table 1: Type of survey

Sl.No.	Type of Surgery	No. of cases	Incisional hernia
1	Elective surgeries	22	3
2	Emergency surgeries	78	8
	Total	100	11

Incidence of Incisional hernia – 11%

(b**)** Site of Hernia:-

Tabl2 2- Site of Hernia

Sl.No.	Incision		Incidence of Hernia
1	Vertical midline	Lower abdomen	6
		Upper abdomen	4
2	Right para median		1
	Total		11

(c) Tone of abdominal wall:-

Out of 11 patients who developed incisional Hernia, the muscle tone was poor for 3 patients and recti were widely separated in 2 patients. In 6 patients, the hernia was small with defect less than $6cm^2$ in size 4 patients had moderate hernia with defect of size 6 to $10cm^2$

(d) Time of occurrence:-

In king's series, 40% of hernias occurred within 4 weeks of index surgery and 75% occurred within 1st year. In Akman's(1962) series [(2)] more than 65% incisional hernias occurred within 1 year after index surgery.

Table 3- Time of Occurrence

Time of occurrence	Total no. of cases
Within 6 months	5
6 months to 1 year	5
1 to 2 years	1

In our study, 45% incisional hernia occurred in 1st six months. 90.9% occurred within 1 year, as shown in above table.

(e) Complications following index surgery:-

Out of 11 cases who developed incisional hernia, 6 cases had postoperative complications following index surgery. Though wound infection is a major predisposing factor, in most cases, the cause could not be found out, where collagen related issues may be a factor. Three patients had burst abdomen, who also had wound infection.

Table 4- Complication following Index surgery

Complication	No. of cases
Wound infection	7/11
Wound seroma	1/11
Wound hematoma	-
Wound disruption	1/11
Burst abdomen	3/11

(f) Associated comorbidity:-

Obesity accounted for 54.5% of incisional hernia patients. Equal to obesity, smoking also plays a major role in incisional hernia etiology. Factors affecting wound healing like diabetes, anaemia , hypo proteinemia and chronic steroid abuse were also seen to be contributing factors. Factors contributing to raised abdominal pressure like chronic cough, chronic constipation were also recorded as contributing factors for incisional hernia. In our table 5, patients had multiple comorbid factors. In general, 7 out of 11 patients had comorbid factors and three patients also developed wound related local complications and finally progressed to develop incisional hernia.

Table 5- Specific Risk factors for Incisional hernia

Specific risk factors	
Obesity BMI >30	6/11
Pulmonary diseases	2/11
Smoking	6/11
Diabetes	3/11
Anemia/ hypoproteinemia	1/11
Constipation	2/11
Chronic steroid abuse	1/11

V. Discussion

In the best centers, the incidence of incisional hernia has been 10% as been shown by long follow up studies by Bucknat of Ellis's team in 1982[3]. Our study too correaltes to the literature survey. In view of time of incisional hernia presentation after index surgery, some patients develop hernia after one year too. No explanation can be given how mature collagen can stretch to form an incisional hernia a year or more after sound healing has occurred. Perhaps, scar tissue is more dynamic tissue than has previously been thought, so that metabolic stresses on the patient might result in some disturbance on dynamic equilibrium of the new collagen.

Study of etiology can be categorized as patient factors and surgical factors. As seen in tabulated results, obesity smoking, sepsis, emergency surgery all contribute as a major factor to formation of incisional hernia. Surgical factors like non anatomical incisions, inappropriate suture material, tension while closing the wound, post operative complications, burst abdomen favour to formation of incisional hernia.

Any mistake such as a badly placed incision, incorrect method of suturing, illjudged selection of suture materials may result in serious complicationlike hematoma formation,infection, stitch abscess, an ugly scar, an incisional hernia or worst of all complete disruption of the wound. Therefore to prevent such complications, certain essentials should be achieved (Harold Elis)[4].

(i) Accessibility :- The incision must give ready and direct access to the anatomy to be investigated and also must provide sufficient room for required procedure to be performed.
(ii) Extensibility :- incision should be extensible in a direction that will allow for any probable enlargement of the scope of surgery.
(iii) security :- Closure of wound must be reliable and ideally should leave abdominal wall as strong after surgery as before.
(iv) Sutures hold best when and where they pull across tissue fibres. Muscles must be split in the direction of their fibres rather than cut across.
(v) Incision must traverse muscle than fascia
(vi) Incisions placed across blood and nerve supply are prone to post operative complication of dehiscence.
(vii) Parallel incisions or T incisions are generally undesirable because of compromise in circulation and innervation of muscles.
(viii) Incision made through different layers of the abdominal wall must as far as possible not to be superimposed.

It is realised from both clinical observations and laboratory animal studies, that healing of incision takes place by formation of dense fibres that unites the opposing faces of laparotomy wound enmase. The purpose of suture is to coapt wound edges and to act as splint while this dense fibre scar deposits and matures. So it is well evident that apparently well healed wound in early post operative period is still remarkably weak. 50- 70% recovery of strength occurs at the end of 6 months and so, for this reason, a suture material that retains its tensile strength for atleast 6 months must be used. The second normal biological feature of repair is the softening of the tissues in the wound edge by collagenase activity[5]. Collagenase is released when the wound is made and it diffuses into the tissues a few mm on either side. As a result tissues at the edge become softened and less able to hold any suture inserted at that point. Therefore wide bite must be taken a minimum of 1cm from wound edge and placed 1cm or less intervals. Better understanding of this pathological anatomy of incisional hernia will sensitize any surgeon in maximum contribution to prevention of Incisional hernia.

VI. Conclusion

Our study has been undertaken to better understand the etiological factors in occurrence of incisional hernia and also to better perceive the pathological anatomy in occurrence of Incisional hernia. Though in all patients contributing factors could not be corrected, surgeon contributing factors could be corrected to the maximum to decrease the incidence of incisional hernia. Also patients should be sensitised that metabolic stresses on the patient might result in disturbance on the dynamic equilibrium of the new collagen resulting in Incisional hernia.

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