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Research Article

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Factors Responsible for The Development of Inguinodynia: A Hospital Based Observational Study

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Abstract

Aim: To study the risk factors for the development of inguinodynia other than surgical skills.

Material and Method

Study design: Prospective observational study. Study population was the inguinal hernia repair patients in Private Speciality Hospital in Pune city of Maharashtra state, India. Study was carried out for the period of two years. A Visual Analogue Scale (VAS) was used to assess the pain scores. Patients with post inguinal hernia repair pain lasting more than 3 months are considered as having inguinodynia. Attempt is made to compare the incidence of inguinodynia.

Statistical analysis: Mean, standard deviation were used as descriptive statistics. For Inferential statistics Chi-square test and Fisher's exact test were used.

Results: Total 100 patients were included in the study. There was significant association between early post-operative pain and inguinodynia ($p = 0.02$). There was significant association between inguinodynia and occurrence of post-operative complications ($p = 0.01$). No statistically significant association between inguinodynia with respect to age, gender, type of hernia, duration of the hospital stay.

Conclusions: No demographic characteristics like age and gender are responsible for inguinodynia. It is also not associated with type of hernia, type of hernia repair used and duration hospital stay. Early post-operative pain is one of the factors responsible for inguinodynia. Inguinodynia is mainly result of surgical skills as other factors are mostly ruled out as cause of the same.

Keywords: *Inguinal hernia; Inguinodynia; Risk factors; Socio-demographic*

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Introduction

Inguinodynia as a hernia post-operative chronic pain syndrome may occur due to an assortment of causes including mesh shrinkage, inflammation, scarification, as well as surgical technique. Chronic postoperative inguinal pain (postherniorrhaphy inguinodynia or CPIP) is defined by the International Association for the Study of Pain as "pain beyond three months after inguinal hernia surgery" [1]. CPIP is

generally classified as neuropathic and non-neuropathic (inflammatory or nociceptive) pain. Neuropathic postherniorrhaphy pain can be a result of nerve entrapment by the inserted mesh or direct damage to inguinal nerves during surgery [2].

The principal clinical characteristics of neuropathic pain are a sharp, burning or 'shooting' sensation which is progressive after repetitive stimulation. Paraesthesia ('tingling', 'crawling', or electrical sensations) and dysaesthesia (spontaneous or evoked unpleasant abnormal sensation) with radiation towards the associated skin area of the involved inguinal nerve are often reported.

Laparoscopy is no better than open surgery at reducing recurrence or chronic pain, however with laparoscopic surgery patients do have less postoperative pain and less superficial wounds [3]. This study was carried out with aim to study the factors responsible for development of Inguinodynia other than surgical skills.

Material & Method

Study area: Tertiary care speciality Hospital in Pune city of Maharashtra state, India

Study population: Patients who were operated for inguinal hernia at during the study time period and were included in the study as per the inclusion and exclusion criteria, mentioned below.

Sample size: Study group consists of total 100 cases who have undergone inguinal hernia repair.

Study design: Prospective cross sectional.

Inclusion criteria

Patients who were clinically diagnosed to have inguinal hernia and who have undergone inguinal hernia repair during time period of this study Age >18 and < 80 yrs

Exclusion criteria

Bilateral inguinal hernias. (To avoid bias) Recurrent inguinal hernia. Complicated inguinal hernia (obstructed, strangulated, incarcerated). Patients suffering from other pain syndromes and chronic disorders like, spine traumas, diagnosed neuropathies, collagen vascular disease, chronic renal failure, bleeding disorders and immune compromised status Patients who have preoperative inguinal region pain. Non- compliant patients. Psychiatric patients.

Detailed study protocol

Patients were selected on the basis of above mentioned inclusion and exclusion criteria. A case record proforma was prepared for each patient.

All patients with an elective inguinal hernia repair performed between May 2013 and May 2015 were included in the study. Patients were evaluated on 7th post-operative day in OPD. Also at the end of 3rd, 6th and 12th (wherever possible) post-operative month. Patients having inguinal region pain for more than and/or after 3 months of elective inguinal hernia repair were considered to have Inguinodynia and were evaluated further.

7th post-operative day evaluation in OPD was included as routine post-operative follow up for all hernia cases, while further follow ups were done for patients who had complains of inguinal region pain or discomfort or delayed resumption of routine activities, based on telephonic or email conversation as part of follow up questionnaire designed for the study.

This questionnaire evaluated outcome and satisfaction with the surgical procedure. All patients were asked if they had pain in their groin/scrotal/thigh region or at the site of the hernia repair at any point. In addition men were asked if they had pain in their testicle on the same side. Those who had pain were asked to grade it as per the severity of pain. Patients were also asked about numbness around

the groin and in the thigh on the side of the hernia operation. They were asked about the character of their pain, effect of pain on general activities, mood, walking ability, normal work, personal relations, sleep and enjoyment of life.

Patients complaining of pain or discomfort were called in OPD for examinations. All these patients were subjected to detailed history taking, including history of pain including onset, duration, progress, severity and character of pain. Visual analogue scale (VAS 0-10) was used to assess the severity of pain. Patients with inguinodynia were classified according to VAS into mild (score 1-3), moderate (4-7) and severe (8-10). The words used to characterise patient's pain were used to classify the pain into neuropathic (sharp, shooting and radiating pain or numbness/pins and needle sensation) and nociceptive (dull, aching or irritating) pain or visceral. Also patients were asked if they suffered from other chronic pain conditions such as chronic backache, headache, irritable bowel syndrome or any other chronic condition associated with pain. The patient was asked if they are on any medications.

A detailed clinical examination was performed after the history taking. Physical examination included local examination of inguinal region to look for local swelling, scar, neuropathy, etc. Also systemic examination was done to rule out systemic diseases complicating the pain.

Patients were also examined for any recurrence of inguinal hernia. Also for other complications like hematoma which included only wound or hernia site hematoma or ecchymosis but not bruising. Seroma included fluid collections at the hernia site. Wound or superficial infection was defined as wound related to infection only and included pus from wound, fistula and sinus formation. Length of hospital stay was defined as time from the day of surgery to discharge from the hospital. Time to return to usual activities was defined as number of days required to resume normal social activities.

Patients were also inquired about the requirement of the treatment they needed for the pain (non pharmacological, pharmacological, interventional, surgical)

Statistical Analysis

Data analysis was done by using statistical package Primer of Biostatistics. Mean, standard deviation, percentages, proportions were used for descriptive statistics. For Inferential statistics Chi-square test, Fisher's exact test and Wilcoxon Sign rank test were used to find the association and significance between 2 groups with various quantitative parameters like gender, type of hernia, type of pain, severity of pain, occurrence of complication etc. P value < 0.05 was considered as significant.

Ethical considerations

The study was conducted according to the Declaration of Helsinki. Institutional Ethical Committee Approval was taken prior to commencement of the study. Written and informed consent was taken from all patients for including them into this study. Patients were provided with Patient information sheet, which had detailed information about the study being conducted and details about their participation and confidentiality of their data.

Results

Total 100 patients were included in the study. Out of which 96 were males and 4 were females. Majority of the patients that is 57 patients were in the age group of 60-79, followed by 40-59 age group, 35 patients while only 8 patients were belonged to 20-39 age group.

Age group	Overall Visual analogue score				Total	P-value
	Nil	Mild	Moderate	Severe		
20-39	7	1	0	0	8	0.901
40-59	28	4	3	0	35	
60-79	48	6	2	1	57	
Total	83	11	5	1	100	

Table 1: *Association between inguinodynia and age of the patient.*

Gender	Overall Visual analogue score				Total	P-value
	Nil	Mild	Moderate	Severe		
Male	79	11	5	1	96	0.999
Female	4	0	0	0	4	
Total	83	11	5	1	100	

Table 2: *Association between inguinodynia and gender of patient.*

There is no significant association between inguinodynia with respect to age and gender of the patients.

Type of Hernia	Overall visual analogue score				Total	P-value
	Nil	Mild	Moderate	Severe		
Direct	49	6	4	1	60	0.397
Indirect	31	3	1	0	35	
Pantaloon	3	2	0	0	5	
Total	83	11	5	1	100	

Table 3: *Association between inguinodynia and type of hernia.*

There was no significant association between inguinodynia with respect to type of hernia.

Method used	Overall Visual analogue score				Total	P-value
	Nil	Mild	Moderate	Severe		
Open	40	6	3	1	50	0.769,
NS						
Lap	43	5	2	0	50	
Total	83	11	5	1	100	

Table 4: *Association between Incidence of Inguinodynia (overall VAS score) and type of repair method used (Open and Laparoscopic).*

There was no significant association between inguinodynia with respect to method used open or laparoscopic.

Length of stay	Overall Visual analogue score				Total	P-value
	Nil	Mild	Moderate	Severe		
≤ 3 days	49	6	3	0	58	0.902
> 3 days	34	5	2	1	42	
Total	83	11	5	1	100	

Table 5: *Association between inguinodynia and length of stay in hospital.*

There was no significant association between inguinodynia with respect to length of stay (days).

VAS at 1st week	Overall Visual analogue score				Total
	Nil	Mild	Moderate	Severe	
Nil	57	2	2	0	61
Mild	25	6	0	1	32
Moderate	1	3	3	0	7
Severe	0	0	0	0	0
Total	83	11	5	1	100

Table 6: *Association between early post-operative pain and inguinodynia (pain between 3 to 6 months).*

There was significant association between early post-operative pain and inguinodynia.

Complication	Overall Visual analogue score				Total
	Nil	Mild	Moderate	Severe	
Infection	0	0	0	1	1
Recurrence	0	1	1	0	2
Seroma	7	2	0	0	9
Nil	76	8	4	0	88
Total	83	11	5	1	100

Table 7: *Association between occurrence of post-operative complications and inguinodynia.*

There was significant association between inguinodynia and occurrence of post-operative complications.

Discussion

Chronic Groin Pain (Inguinodynia) following inguinal hernia repair is a significant, though under-reported problem. Mild pain lasting for a few days is common following mesh inguinal hernia repair. However, moderate to severe pain persisting more than 3 months after inguinal herniorrhaphy should be considered as pathological. The major reasons for chronic groin pain have been identified as neuropathic cause due to inguinal nerve(s) damage or non-neuropathic cause due to mesh or other related factors. The symptom complex of chronic groin pain varies from a dull ache to sharp shooting pain along the distribution of inguinal nerves [4].

In the present study we assessed various factors which could be responsible for inguinodynia. We found that there was no statistically significant association between inguinodynia with respect to age, gender, type of hernia, duration of the hospital stay. There was significant association between early post-operative pain and inguinodynia. There was significant association between inguinodynia and occurrence of post-operative complications.

Patients were divided into 3 age groups for comparison. Groups were of age groups between 20 to 39 years, 40 to 59 years and between 60 to 79 years. In group of less than 40 years of age, only one patient had mild post-operative pain out of total 8 patients. In group of age between 40 to 59 years, out of total 35 patients, 4 had mild pain while 3 had moderate pain. In age group of 60 to 79 years, 6 patients had mild pain, 2 had moderate pain and 1 patient had severe pain. Comparison between incidence of inguinodynia and these age groups showed p value of 0.901(not significant). This shows there is no association between age of the patient undergoing hernia surgery and incidence of inguinodynia.

Manangi. et al. study found no relation between age and incidence of chronic pain [5]. Courtney., *et al*. found that the risk of chronic pain decreased with increasing age, from 39 to 58% in patients aged less than 40 years to 14-17% in patients aged more than 65 years [6]. Langeveld et al stated that younger patients (18-40 years) presented more often with CPIP than middle aged patients (40-60 years) and elderly (> 60 years), 43% vs. 29% vs. 19% [7]. Studies that had gender-specific data showed the highest pain incidence in women. In a study by Mori et al. where 15% of 224 patients undergoing mesh hernia repair were women, three of the four patients with continuous pain were women resulting in an incidence of chronic pain of 0.5% in males versus 8.8% in females [8]. In a retrospective study of 594 men and 56 women, 3% of males and 11% of female patients developed chronic pain [9]. Bay–Nielsen M., *et al*. described female sex as an independent risk factor for the development of inguinodynia. This is possibly because females report the pain more and also have lower pain threshold [10]. In our study, incidence of pain in females is less, possible due to less number of female patients. Larger sample size is required to find true association. In conclusion, these findings suggest that females are at a higher risk of developing chronic pain than males.

In the present study, it was found that early postoperative pain correlated with development of inguinodynia. In a prospective study by Lau., *et al*. of 313 patients undergoing a laparoscopic repair, patients who had pain on coughing on the 6th postoperative day had a significant higher risk of developing chronic pain [11]. In study by Heikkinen., *et al*. of 123 patients, four patients developed a chronic neuralgia type pain and had higher VAS scores on day 14 [12]. This finding is in agreement with a large prospective study by Callesen., *et al.* involving 466 unselected patients 1 year after surgery, where the risk of chronic pain was significantly higher in patients with a high early postoperative pain score compared to those with a lower postoperative pain score [13].

Comparison of incidence of inguinodynia between open and laparoscopic groups at 3 months has p value of 0.731 (not significant) and at 6 months it is 0.715 (not significant). As per there is no apparent difference in recurrence between laparoscopic and open mesh methods of hernia repair. The data suggests less persisting pain and numbness following laparoscopic repair. Return to usual activities is faster. However, operation times are longer and there appears to be a higher risk of serious complication rate in respect of visceral (especially bladder) and vascular injuries [14].

As summarised by Jeffrey B. Mazin potential causes of inguinodynia is breach of surgical technique which included poor mesh placement, nerve entrapment, osteitis pubis, loss of domain, compromise of spermatic cord, inappropriate tack placement laparoscopically or suture placement with open technique, neuropathy secondary to exaggerated scarification response, plug repair with secondary concrete-like mass and possible neuropathy from resultant scarification, idiosyncratic response to mesh implantation, post-op infection or fistulization/sinus formation infected mesh-toxic shock syndrome [15].

Conclusion

In the present study we conclude that no demographic characteristics like age and gender are responsible for inguinodynia. It is also not associated with type of hernia, type of hernia repair used and duration hospital stay. Early post-operative pain is one of the

factors responsible for inguinodynia. Multi-centric studies are recommended for more conclusive results. The present study discussed the socio-demographic and some important factors other than surgical skills which is one of the most important factor for inguinodynia.

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