

Original Research Article

Pre-operative rehabilitation in reducing post operative pain

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ABSTRACT

Background: Prehabilitation is the process of improving the functional reserve of the patient. It is being a new paradigm increasingly being applied in recent days for all types of surgeries. The postoperative outcome of the patient is being affected if their functional reserve is low. It induces major complications, reduced ambulation and higher respiratory and wound related complications. One of the major factors in reducing the mobility of the patient is postoperative pain following surgery. Many studies are being done in assessing the effectiveness of prehabilitation in improving the postoperative outcome of the patients. We have done a study to evaluate the efficacy of the prehabilitation in relation to the postoperative pain score in pancreatic surgery and its outcome.

Methods: To study the effect of prehabilitation over the postoperative pain score. All patients related to benign and malignant disorders of pancreas who were subjected to surgery were taken in to study. The nutritional regimen, additional protein intake and their physical activity along with their preoperative Metabolic equivalents were taken in to study. All patients were studied for their postoperative pain score and data generated comparing their preoperative workup with postoperative pain scale.

Results: The higher metabolic equivalents had a higher significant value relating to their pain scale. The distance covered in a day also influenced the postoperative pain. About the protein intake it was shown that additional protein intake in the preoperative period has shown a significant impact on the postoperative pain scale.

Conclusions: From this little cohort group it cannot be generalised but In relation to the prehabilitary measures for pancreas related surgery in our surgical gastroenterology department. It is shown that preoperative additional protein intake and their physical activity especially their metabolic equivalents prior to surgery had a good relation to their pain scale showing a positive correlation between them.

Keywords: Prehabilitation, Physical activity, Metabolic equivalents, Postoperative pain

INTRODUCTION

Prehabilitation is the process of increasing the physiological reserve of the patient by means of preoperative optimising procedures. They include optimising the comorbidities, preoperative physical activity, psychological counselling, improving the nutritional status of the patient. Optimising these

parameters increases the outcomes of surgeries. They include less pain, early recovery, reduced stay and overall complications. Postoperative pain forms the major part of morbidity especially in abdominal and thoracic surgeries. Pain causes prolonged immobilization, reduced respiratory efforts and its complications. In abdominal surgeries they form a major part of morbidity especially in prolonged procedures which involves midline or

muscle cutting incision, dissection of deeper tissues with resection of part of viscera and its adjacent tissues which produces more tissue trauma thus more inflammation and more pain. The study of isolated postoperative pain as a primary outcome was not carried out in many studies.¹⁻³ Here we took a study comparing the prehabilitation measures in relation to its effect on postoperative pain. The studies of pain over other parameters were not taken as a primary outcome in major gastrointestinal related surgery.¹⁻⁷ In our institute we did a prospective study regarding the postoperative pain score involving surgeries related to pancreatic disorders of both benign and malignant and its relation to the prehabilitary measures. The objective of the study is to compare the preoperative rehabilitation in reducing the postoperative pain especially in pancreatic surgeries which has been carried out in our institution.

METHODS

To study the effect of prehabilitation over the postoperative pain score. All patients related to benign and malignant disorders of pancreas who were subjected to surgery were taken in to study. Prospective study conducted in Institute Of surgical gastroenterology and liver transplantation in government Stanley medical college from the period of October 2021 to October 2023. Total number of patients taken in to study was 32. Inclusion criteria are all patients undergoing pancreatic surgery in the above-mentioned period including benign and malignant. Age criteria were from 18 years to 75 years.

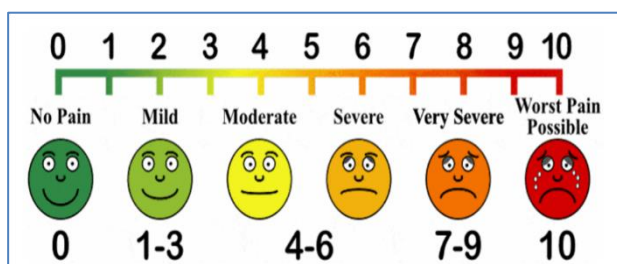


Figure 1: Visual analog pain scale.

The exclusion criteria are those with Non pancreatic surgeries, those with high comorbidities, those who are physically challenged, those who are bedridden, and those who are not willing for the study. Also the patients who undergo emergency surgeries and extremes of age were taken out of study. These patients were engaged in our trial which included daily physical activity and nutritional regimen. The Nutritional regimen was three meals per day with food of their choice with additional eggs per day from one egg to a maximum of six per day. Preoperative physical activity were the number of days of preoperative physical activity from the day of admission to their elective surgery and the distance covered by them by the number of steps per day was taken in to study. It was calculated using the mobile steps counter. All patients underwent surgery as decided preoperatively in

an elective manner. Their postoperative pain score were calculated using the visual analogue pain scale (Figure 1). The dose of postoperative analgesia, the postoperative day in which they were first ambulated and confounding factors like Ryle's tube, drainage tube and urinary catheters were included in the study. Moreover, the type of incision whether it was a midline or muscle cutting were also taken in to the study.

Statistical analysis

The collected data were entered in the Microsoft Excel 2016 and analysed with IBM SPSS Statistics for Windows, Version 29.0. (Armonk, NY: IBM Corp). To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean $\pm$ SD were used for continuous variables. To find the significant difference between the bivariate samples in independent groups the Mann-Whitney U test was used. To assess the relationship between the variables Pearson's Correlation was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS

All of the 36 patients were subjected to prehabilitatory physical activity.¹ Out of them 4 underwent emergency surgery and were taken out of study. They all had infective complications and were taken up for emergency surgery. Among the 32 patients, the age distribution was 40.6 in females and 59.4 in males (Table 6). The minimum duration of physical activity from the day of admission to surgery was from 7 days to a maximum of 30 days. The prolonged stay was due to their comorbidities which got optimised during their pre surgical period. They were made to walk on the floors and ramps, were all were instructed to walk briskly as possible and mobile step counter application were used to calculate the distance they covered. The distances covered by them were from minimum of 1000 feet to maximum of 12200 feet per day. The mean was 4261.9 steps (Table 1). With a mean of 15.1 days as their physical activity. The additional protein taken by them were from zero in one patient to the maximum of 30 grams per day.³ The average additional intake of protein was 16 grams per day. The preoperative physical activity which was related to their routine job was also taken. The data was collected by their metabolic equivalents. The lowest was 3 and the highest MET equivalent was 8 and the average was taken as 4.8. Out of the 32 patients 81.3% quitted smoking for at least 3 weeks before surgery. But 18.8% (Table 7) had smoking less than 7 days prior to surgery (Table 3, 4, 5). The postoperative pain score were done with visual analog pain scale. The lowest pain score obtained was 3 and the highest being 10 the severe pain. The postoperative pain was calculated for consecutive 3 days. All those factors which affect the pain which include the drain tubes, catheters were taken as confounding factors.

Table 1: Statistical data.

Pain score		Age	Protein (g)	Physical Activity (days)	Distance covered - steps	Epidural dose	Occupation in met equivalents
Pod-1	R value	-0.292	-0.494**	-0.029	-0.405*	0.253	-0.656**
Pod-1	P value	0.104	0.004	0.873	0.022	0.163	0.0005
Pod-1	N	32	32	32	32	32	32
Pod-2	R value	-0.209	-0.473**	-0.004	-0.365*	0.252	-0.650**
Pod-2	P value	0.251	0.006	0.983	0.040	0.164	0.0005
Pod-2	N	32	32	32	32	32	32
Pod-3	R value	-0.219	-0.483**	-0.072	-0.318	0.147	-0.702**
Pod-3	P value	0.227	0.005	0.696	0.076	0.423	0.0005
Pod-3	N	32	32	32	32	32	32

**Correlation is significant at the 0.01 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed)

The dose of postoperative analgesia which we use in our institute was epidural and its dose was taken in to consideration.

Table 2: Statistical significance reference values.

P value	Highly statistically significant at $p < 0.01$
P value	Statistically significant at $0.01 \leq p \leq 0.050$
P value	No statistically significant a $p > 0.050$

All patients were mobilised on the first postoperative day and hence it was taken out of the study. Considering smoking related to postoperative pain it was seen in our study that smoking does not provide a significant relation to the pain on day 1-3 post operatively.²

Table 3: Smoking and its relation.

Smoking		N	Mean rank	Sum of ranks
Pain score POD-1	0.0	26	17.35	451.00
Pain score POD-1	1.0	6	12.83	77.00
Pain score POD-1	Total	32	-	-
Pain score POD-2	0.0	26	16.98	441.50
Pain score POD-2	1.0	6	14.42	86.50
Pain score POD-2	Total	32	-	-
Pain score POD-3	0.0	26	17.81	463.00
Pain score POD-3	1.0	6	10.83	65.00
Pain score POD-3	Total	32	-	-

The lowest p value obtained was on pod-3 which was 0.086 but it was not significant. About the protein intake it was shown that additional protein intake in the preoperative period has shown a significant impact on the

postoperative pain scale.

Table 4: Group statistics smoking.

Smoking		N	Mean	SD
Pain score postoperative day-1	Present	6	6.33	1.37
Pain score postoperative day-1	Absent	26	7.12	1.31
Pain score postoperative day-2	Present	6	5.67	1.21
Pain score postoperative day-2	Absent	26	6.12	1.34
Pain score postoperative day-3	Present	6	4.83	1.17
Pain score postoperative day-3	Absent	26	5.88	1.31

Table 5: Mann Witney U test- smoking.

Pain score	Mann-Whitney U	Z	P value
Postoperative day -1	56.000	-1.108	0.268
Postoperative day -2	65.500	-0.637	0.524
Postoperative day -3	44.000	-1.716	0.086

Grouping variable: smoking

Table 6: Age distribution.

Sex	N	%
Female	13	40.6
Male	19	59.4
Total	32	100

Table 7: Smoking distribution.

Smoking	N	%
Absent	26	81.3
Present	6	18.8
Total	32	100

The p value was 0.004 on day 1. 0.006 on day 2 and 0.005 on day 3 post operatively. This value was statistically significant with value of $p < 0.01$ (Table 2). But it is also seen that the preoperative metabolic equivalents had much a significant value in their postoperative pain scale that is their day to day routine activity preoperatively before admission. The higher metabolic equivalents had a higher significant value relating to their pain scale. On all days it was showing a p value of < 0.005 (statistically significant).

The distance covered in a day also influenced the postoperative pain those who experienced less pain walked more than 5000 feet per day. It showed a significant impact on the postoperative pain for the first 2 days. On the third day the p value was 0.76 which was not statistically significant. Even the number of days of ambulation was not significantly related than to the distance covered per day. Those who experienced less pain also showed a reduced hospital stay compared to those who experienced pain.

DISCUSSION

This cohort study examined the relation of prehabilitation in pancreatic surgery patient admitted in a single institute to their postoperative pain score.⁴ Out of the 32 patients taken in to study it was shown that preoperative activity which was their job had a significant impact on the postoperative pain scale. It was shown that those who had a high metabolic equivalent score perceived a low pain compared to those who are not such active. It was shown from our study that those who had additional protein intake also perceived less pain on the scale. Duration of physical activity didn't find a significant impact on their pain but the extend of physical activity on a single day measured by their walking steps had a significant impact on their pain scale. Those who walked an average of more than 4200 step per day had much less pain on their pain scale. All postoperative patients were given epidural analgesia but the dose of drug didn't find a significant impact on their pain scale since all were given a minimal dose of 5ml per hour except for 2 patients who had a maximal dose of 12 ml/hour but still had higher pain score.

Smoking didn't find a significant value on their pain scale. The type of incision used was also taken in to study but there was no significant impact on their pain scale regarding a midline or muscle cutting incision. The confounding factors like Ryles tube, drainage tubes and catheters were also taken In to study but these factors didn't find a significant value since all had at least two of these factors. The day of ambulation which was taken in to study was also taken but it became negligent since all were made to walk on pod-1. For all the patients who have undergone surgery in our study, table mount retractors were used for retracting abdominal wall muscles. Thirty percentage of the patients had malignant disorder but pain score doesn't differ much between

them. There is no difference in the incision type and the perceived pain. Even those with midline had moderate pain score similar to those with muscle cutting incision. The duration of surgery on an average was 3 hours 15 minutes. The longest was 7 hours in a malignant patient. But even for those with 7 hours of retraction there was no much difference in the pain score when compared to those with a shorter time interval. Except for 4 patients all received epidural analgesia. Those who has not received had their pain score of moderate intensity and their met equivalents are 4 and above. It is seen from our study that prehabilitation had an impact on the postoperative pain scale in relation to their protein intake, the number of steps reached per day and their preoperative routine activity (job). All these had a significant impact on their pain scales.⁵⁻⁸

Limitations

This is a single centre study with a small number of cohorts without randomization and hence no comparison group. Single objective tool was taken for assessing the pain.

CONCLUSION

From this little cohort group it cannot be generalised but it is shown that in pancreatic surgery which is usually a morbid procedure it has been shown that postoperative pain score can be mitigated by the prehabilitory measures. In our study it is shown that preoperative additional protein intake and physical activity of simple brisk walking of minimal 4200 steps per day can reduce the postoperative pain scores. It is also shown that their pre admission activity which is their job in those who do much physical activity measured by means of metabolic equivalents showed that who had a better score in their MET Equivalents experienced less pain post operatively.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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