

## Comparison of subcuticular versus interrupted sutures in open cholecystectomy right subcostal incision

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### Abstract

**Background:** Post-operative pain occurs after open cholecystectomy is caused by stimulation of sensory nerves in injured soft tissue, particularly in the area where the skin incision occurs. The inflammatory pain occurs due to tissue damage that causes an inflammatory response caused by the release of a local mediator with systemic effect.

**Objective:** To compare the frequency of post-operative pain in subcuticular versus interrupted sutures in open cholecystectomy right subcostal incision.

**Materials and Methods:** This randomized controlled trial was conducted at General Surgical Department unit 'B' of Khyber Teaching Hospital, Peshawar, over a period of one year from January 2017 to December 2017. This study was carried out on 80 patients, 40 in each group. All patients were operated by a consultant surgeon. Skin closed either sub-cuticular (Group A) or interrupted technique (Group B) using prolene suture to close right subcostal incision. Post-operative evaluation of the patients were done on 3rd post-operative day and data regarding post-operative pain was recorded from both groups on Visual analogue scoring and noted on especially designed proforma. Then it was reviewed to compare the frequency of post-operative pain in sub-cuticular versus interrupted sutures.

**Results:** In Group A, post-operative pain was recorded in 5 (12.5%) patients whereas in Group B, it was recorded in 23 (57.5%) patients.

**Conclusion:** Patients were more satisfied in subcuticular skin wound closure technique in terms of pain and we recommend subcuticular skin closure after cholecystectomy.

**Keywords:** Post-operative pain, Open cholecystectomy, Subcuticular sutures, Interrupted sutures

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### Introduction:

Post-operative pain occurs after open cholecystectomy is caused by stimulation of sensory nerves in injured soft tissue, particularly in the area where the skin incision occurs. The inflammatory pain occurs due to tissue damage that causes an inflammatory response caused by the release of a local mediator with systemic effect.<sup>1,2</sup>

The word "suture" describes any strand of material used to ligate (tie) blood vessels or approxi-

mate (bring close together) tissues.<sup>3</sup> Secure abdominal wound closure depends on the repair of musculo-fascial layer of abdominal wall.<sup>4</sup>

Musculo-fascial layer of abdominal wall consist of external oblique abdominal, internal oblique abdominal and transverse abdominal muscles and their aponeurosis. In the midline incision-linea alba, right paramedian and right subcostal incision-anterior and posterior layer of rectus sheath of the musculo-fascial layers are involved.

Suturing techniques play vital role in post-operative pain.<sup>5</sup>

Subcuticular sutures are continuous sutures placed in the dermis, beneath the epithelial layer.<sup>6</sup> Continuous subcuticular sutures are placed in a line parallel to the wound. This technique involves taking short, lateral stitches along full length of the wound. After the suture has been drawn taut, the distal end is anchored in the same manner as the proximal end. This may involve tying or any of a variety of anchoring devices.

Subcuticular suturing may be performed with absorbable suture which does not require removal, or with monofilament non-absorbable suture that is later removed by simply removing the anchoring device at one end and pulling the opposite end.<sup>7</sup>

Interrupted sutures use a number of strands to close the wound. Each strand is tied and cut after insertion. This provides a more secure closure, because if one suture breaks, the remaining sutures will hold the wound edges in approximation.<sup>8</sup> Interrupted sutures may be used if a wound is infected, because micro-organisms may be less likely to travel along a series of interrupted stitches.

Open cholecystectomy is still commonly done procedure in our setups for multiple reasons that's why we chose this topic and since it is a commonly done procedure this study can be used as a reference regarding other elective procedures with same rationale in few terms. In a study by Patel K and his colleagues, they found that frequency of postoperative pain in subcuticular sutures was 10.71% and in interrupted sutures it was 62.26% after cholecystectomy.<sup>9</sup>

There is paucity of data on this topic at international level. No such study has been done before in population of Pakistan. Therefore further evidence is needed that's why, we have designed the study as randomized fashion between two methods of wound closure (interrupted and subcuticular closure) and to compare outcome

of wound pain between them. To minimize the influence of suture materials we used same suture materials in similar level of fascial closure in both groups of patients. Our study will generate the further local evidence and pave the way for our doctors community in selection of wound closure method to minimize pain after cholecystectomy.

**Objective:** To compare the frequency of post-operative pain in subcuticular versus interrupted sutures in open cholecystectomy right subcostal incision.

**Hypothesis:** It is hypothesized that there will be less post-operative pain in subcuticular as compared to interrupted sutures in open cholecystectomy right subcostal incision.

#### **Material and Methods:**

This randomized controlled trial was conducted at General Surgical Department unit 'B' of Khyber Teaching Hospital, Peshawar, over a period of one year from January 2017 to December 2017. Sample size was calculated with 95% Confidence level and  $\alpha = 5\%$  (two-sided) with power=80%. While  $p_1 = 10.71\%$ .<sup>9</sup> and  $p_2 = 62.26\%$ .<sup>9</sup> where  $p_1$  is the expected proportion in population 1 and  $p_2$  is the expected proportion in population 2 of post-operative pain in reference study. Estimated sample size was 26 but we used 80 sample size for better evidence. 40 patients in subcuticular group or Group A and 40 patients in interrupted group or Group B.

Non-probability consecutive sampling was used in sampling technique. All patients of age 18-40 years either sex with gallstones  $\leq 5$  in numbers (size < 3cm) on ultrasound for > 6 months, ASA grade I and II and planned open cholecystectomy were included in the study. Patients with history of upper abdominal surgery, hypertension, diabetes and coagulopathies were excluded from the study.

Patients fulfilling the inclusion criteria from Indoor General Surgical Department of Khyber Teaching Hospital Peshawar were included in

Table-1: Stratification of post op pain with respect to age in both groups (n=80)

Age	Post Op Pain	Group A (n=40)	Group B (n=40)	P Value
18-30 Years	Yes	03 (7.5%)	10 (25%)	0.019
	No	18 (45%)	11 (27.5%)	
31-40 Years	Yes	02 (5%)	13 (32.5%)	0.0002
	No	17 (42.5%)	06 (15%)	

Table-2: Stratification of post op pain with respect to gender in both groups (n=80)

Age	Post Op Pain	Group A (n=40)	Group B (n=40)	P Value
Male	Yes	03 (7.5%)	14 (35%)	0.0025
	No	19 (47.5%)	11 (27.5%)	
Female	Yes	02 (5%)	09 (22.5%)	0.003
	No	16 (40%)	06 (15%)	

the study after permission from ethical committee and research department of Khyber Teaching Hospital Peshawar. A detailed explanation about the participation in the study was given to the patient and a written informed consent were obtained explaining the risks and benefits of the study. Basic demographics like age, gender, weight, height and Body Mass Index were also noted.

Envelops were prepared. Each envelop contained a paper with specific request for the operating surgeon. The statement was either "Please, suture the wound with subcuticular Prolene" or "Please, suture the wound with interrupted Prolene". The envelops putted in a big box and mixed together. The box was given to the anesthetist who requested to open a random envelop at the time of closure of wound to read the enclosed statement to the operating surgeon who complied with the request. All the patients were operated under general anesthesia by a consultant surgeon having minimum of 3 years of experience and well versed with open cholecystectomy. Skin closed either subcuticular prolene or interrupted technique using prolene as per group assigned to close right subcostal incision. Post-operative management along with routine antibiotics and analgesics were given to all patients.

Post-operative evaluation of the patients was done on 3rd post-operative day and data regarding post-operative pain recorded from

both groups by any score from 0-10 on Visual analogue scoring and noted on especially designed proforma. Then reviewed to compare the frequency of postoperative pain in subcuticular versus interrupted sutures.

Data analyzed with statistical analysis program (SPSS V-20). Analysis was done to compare proportion of outcome between these two groups. Frequency and percentage were computed for qualitative variables like age groups, gender, ASA grade and post-operative pain. Mean±SD for quantitative variables like age, duration of complain, VAS score, weight, height and BMI. Chi-square test applied to compare post-operative pain on 3rd post-operative day in both groups taken  $P \leq 0.05$  as significant. Stratification done with regard to age, gender, duration of complain, ASA grade, and BMI to see the effect of these on post-operative pain on 3rd post-operative day. Post stratification using the chi-square test for both groups,  $P \leq 0.05$  will be considered statistically significant.

#### Results:

This study was carried out on 80 patients at the Department of General Surgery, KTH, Peshawar. The results of our study are as appended below:-

As per age wise distribution, in Group A, 21(52.5%) patients were recorded in 18-30 years age group whereas 19(47.5%) patients were recorded in 31-40 years age group. Similarly, in Group B, 21(52.5%) patients were recorded in 18-30 years age group whereas 19(47.5%) patients were recorded in 31-40 years age group.

As per gender wise distribution, in Group A, 22(55%) patients were recorded as male patients whereas 18(45%) patients were recorded as female patients. Similarly, in Group B, 25(62.5%) patients were recorded female patients whereas 15(37.5%) patients were recorded as female patients.

In Group A, mean and SD for age was  $30.0 \pm 3.6$ , ASA Grade was  $2.0 \pm 0.49$ , duration of complain was  $2.0 \pm 0.90$  days, VAS Score was  $5.0 \pm 1.10$  and

for BMI  $25.17 \pm 1.47$ . Mean and SDs in Group B for age was  $30.0 \pm 0.36$ , ASA Grade was  $2.0 \pm 0.36$ , duration of complain was  $4.0 \pm 0.90$ , VAS Score was  $7.0 \pm 1.25$  and for BMI it was  $25.73 \pm 1.27$ .

Post-operative Pain in Group-A was recorded in 5 (12.5%) patients whereas in Group-B, it was recorded in 23 (57.5%) patients.

Stratification of post-operative pain in both groups with respect to age and gender are shown in table No. 1 and 2 respectively.

### Discussion:

Most surgical procedures involve a cut in the skin making the surgeon to gain access to the surgical site. Several ways exist to close the surgical incision e.g. sutures, staples, tissue adhesives or tapes. Skin sutures can either be continuous or interrupted. Mostly, continuous sutures are sub-cuticular and can be absorbable or non-absorbable. The interrupted sutures on the other hand are non-absorbable and involve full skin thickness.

The obligate goals of wound closure include obliteration of dead space, even distribution of tension, and tensile strength maintenance across the wound. Suture closure allows primary wound healing as it holds the tissue in proximity until much healing has occurred to withstand stress without the mechanical support. A sterile field and a meticulous aseptic measure are critical to minimize the risk of post-operative pain and infection. Closure should serve both functional as well as aesthetic purposes.<sup>10</sup>

The technique of closure should be easy, quick, simple and cost-effective with an aim to achieve wound cosmesis and patient satisfaction.<sup>9</sup> Complications of wound healing including pain, hypertrophic scars, infection and dehiscence can result due to patient factors such as nutritional status, incorrect selection of the suture or technique which results in excessive tension across the wound.<sup>8</sup>

Now-a-days laparoscopic cholecystectomy has become much popular, however, open cho-

lecystectomy is still accepted as a simple and cost-effective operation. Techniques for wound closure for open cholecystectomy are not well studied. The ones in vogue are vertical mattress or simple interrupted sutures, while sub-cuticular is recommended in cases of uncomplicated cholelithiasis. Absorbable sub-cuticular sutures seem to be better to mattress suturing in terms of aesthetic outcomes, cost-effectiveness, patient satisfaction and infectious complications.<sup>11</sup>

In our study, the patients who underwent open cholecystectomy for uncomplicated cholelithiasis were taken. The patients in whom skin incision was closed with sub-cuticular monofilament suturing were more satisfied compared to the control group in terms of pain score. Nevertheless, sub-cuticular suturing has been recommended a safe and preferred method as compared to interrupted non-absorbable suturing in different types of surgical procedures.<sup>12</sup>

In a study by Tanaka A et al the wound complication incidence in elective colon cancer surgery does not increase when using technique of sub-cuticular suturing. The patients preferred this technique in terms of better cosmetic results and less pain.<sup>13</sup> According to Javadi S et al skin closure using sub-cuticular suturing after appendectomy may be safe and feasible with better cosmesis and lower levels of pain.<sup>14</sup> Gurusamy KS et al compared the continuous with interrupted skin closure techniques in patients undergoing non-obstetric surgery and concluded reduced dehiscence in continuous sub-cuticular sutures.<sup>7</sup>

According to Stockley I et al, there was a higher incidence of local discomfort and pain with staples as compared to Nylon vertical mattress sutures in 129 cases.<sup>15</sup> Another research by Ranaboldo J et al, studied 48 patients in terms of wound pain and analgesia requirement with staples or sutures for skin closure. It came out to be lower in the sutured group.<sup>16</sup>

Patel K et al also compared vertical mattress and subcuticular techniques for skin closure. According to them wound pain was more on 7th

and 14th post-operative day in vertical mattress group.<sup>9</sup> Frishman GN et al did the earliest trial to investigate skin closure and post-operative pain. They concluded less pain at hospital discharge and six weeks post-operative in patients when sub-cuticular suture rather than surgical steel staples are used.<sup>17</sup>

The different nature of sutures was not studied in our research which needs to be evaluated or compared in future. Further, well-designed trials at a much lower risk of bias are necessary to ascertain which type of suturing is better. The study can be a basis for studying the other parameters influenced by the choice of suturing technique.

#### **Conclusion:**

In our study we concluded no difference in the rates of wound infection and formation of scar tissue between the group A and group B, the duration of surgery was less and the patients were more satisfied in group A in terms of pain.

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#### **Role and contribution of authors:**

Dr. Munir Ahmad, conception and design, drafting the manuscript and final approval of the version to be published.

Dr. Afroz Mushtaq Khattak, helped in data collection and references, final approval for publication.

Dr. Mubashira Ahmad, helped in data analysis, discussion writing and final approval for publication.

Dr. Zia uddin Afridi, critical revision, references.

Dr. Abid Haleem, supervision and making final changes for approval of the version to be pub-

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