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Abdominal Scar Revision Surgery

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Abstract: Background: Abdominal scar revision surgery is a common procedure to improve the cosmetic and functional aspects of scars resulting from any surgical procedure or trauma. The aim of this study is to evaluate demographic data, surgical techniques, outcomes, and complications of abdominal scar revision surgeries. Methods: A cross-sectional study was conducted among 77 patients who underwent abdominal scar revision surgery in different hospitals in Iraq from June 2023 to June 2024. Data were collected on etiologies of abdominal scars, surgical procedures (excision {39%}, Z-Plasty {32%}, and grafting {92%}), post-operative pain, complications, and quality of life outcomes using the SF-36 questionnaire. Results: Demographic profile of the patients revealed that 39% belonged to the age group of 36-45 years, with an excess female dominance (58%) compared to males (42%). Surgical scars (45%) and traumatic scars (32%) were the most frequent indications for surgery. Excision was the most common operation performed (39%). Hospital stay was inconsistent, with 52% discharged between 1 and 2 days. Postoperative pain was most frequently on day 1 (52%). Global satisfaction rates showed that 65% of the patients had a total success. Pain or discomfort-related complications (32%) and hypertrophic scarring (23%) were noted. Quality of life measures indicated high scores in physical and mental health domains. Conclusion: The findings demonstrate that abdominal scar revision surgery can be followed by high patient satisfaction and quality of life improvement despite major complications. Increased emphasis on patient teaching regarding anticipated risks and realistic outcomes may result in greater overall satisfaction with the procedure.

Keywords:. Abdominal scar revision surgery, demographics, excision, z-plasty, grafting, complications, and sf-36 quality of life questionnaire.

INTRODUCTION

Abdominal scars resulting from surgical procedures, trauma wounds, or skin diseases might significantly influence a person's outside appearance and mental well-being. Scars represent a natural process of the healing process but may contribute to serious cosmetic problems, which restrict patients' self-esteem and social life (Miranda, B. H. *et al.*, 2015; Pérez-Bustillo, A. *et al.*, 2013) With the growing prevalence of surgical operations, such as appendectomies and cesarean sections, all over the globe, abdominal scar revision surgery has become a crucial part of plastic and reconstructive surgery (Van Zuijlen, P. P. *et al.*, 2002). Scar revision refers to surgical and nonsurgical techniques applied to minimize the appearance of scars with a view to restoring normality to the lesion, maximizing function, and enhancing patients' quality of life. (Mallucci, P. *et al.*, 2009)

Over the last few years, the art of scar management has increased exponentially with improved results from the newer methods, in the backdrop of surgical interventions, newer methods such as excision, Z-plasty, and grafting have been developed, each for specific indications and outcomes (Cavadas, P. C. 2001; Klein, A. W. 2001; Fagien, S., & Elson, M. L. 2002). In order to evaluate properly the effectiveness of these techniques, an accurate snapshot of the patient population, operations performed, complications, and patient-reported outcomes must be known. (McGregor, A. D., & McGregor, I. A. 2000)

Specific mention is made to the classification of surgery techniques applied, with an understanding that technique choice has a direct influence on the outcome. Excision breaks up scar tissue so new skin can regenerate, and Z-plasty moves nearby tissue to conceal scars in normal skin folds (Billings Jr, E., & May Jr, J. W. 1989). Grafting is also used in certain cases, where indicated by the nature and location of the scar. A careful evaluation of each method's effectiveness, recovery time, and complication rate gives a complete understanding of the surgical situation for each case (Batra, R. S. 2005). In addition, intraoperative data analysis provides an overview of the short procedural variables influencing post-operative outcomes, determining recovery, complications, and patient satisfaction. Health-related quality of life (HRQoL) is a significant indicator applied to determine the success of operations, and therefore, it is essential to evaluate

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the patient's experience post-surgery. (Sullivan, T. A. *et al.*, 1990)

The Short Form Health Survey (SF-36) is used in this study, which is a thoroughly validated measurement instrument applied to assess health-related quality of life in various domains (Beausang, E. *et al.*, 1998). The survey quantifies physical functioning, role-physical, pain bodies, and mental health. Results show that scar revision surgery significantly enhances quality of life, illustrating the many advantages of the procedures (Martin, D. 2003). These outcomes show the overall improvement beyond appearance, illustrating how surgery outcomes translate through to other areas of a patient's life, reaffirming their confidence and enhancing their functional capacity (Martin, D. *et al.*, 2003). This study will analyze the outcomes of abdominal scar revision surgery based on demographic factors, surgery, postoperative results, and health-related quality of life as it is measured by some quality of life surveys.

METHODOLOGY

Study Design

This study employed a cross-sectional cohort design in evaluating the outcomes of abdominal scar revision surgery. The study aimed to quantify patient demographics, surgical procedures, complications, and quality of life improvement following surgery. The primary goal was to evaluate the efficacy and patient satisfaction of patients undergoing scar revision, comprising measurable surgical outcomes and postoperative complications. The study was conducted at a tertiary hospital during June 2023 - June 2024.

Participants' Data Collection

Seventy-seven participants were enrolled in the study, on some inclusion criteria: adults aged 25 - 55 years and above with abdominal scars. The participants were categorized according to demographics, clinical history, and socioeconomic status. Demographic data were collected using structured questionnaires, like age, gender, BMI, smoking, and comorbidities. Our investigation's profile set that the majority of the participants were female (58%), and the mean BMI was 28.5 kg/m². Comorbid illnesses were reported, and the most prevalent was hypertension at 39%.

Surgical Management and Intraoperative Data

Surgical care comprised three primary approaches: excision, Z-plasty, and grafting. The choice of surgery method was based on the type and size of the scar, as determined by preoperative assessment. The indication for surgery it had been trauma and surgical scars, of which the majority were from surgery (45%). It also revealed the indication for which individuals had abdominal scars, and these were primarily cesarean section (32%) and appendicitis (26%). The placement classification of where the scar was located in the procedure was noted, where 45% of the scars were from horizontal incisions. Intraoperatively collected data included the incision length, technique, and surgical complications.

Post-Operative Data

Post-operative data was confirmed through follow-up appointments, such as complications, assessment of pain, and overall satisfaction with the surgery's result. The recovery period was monitored, with discharge hours separated into three categories: same-day, 1-2 days, and 3+ days. Postoperative pain was assessed at various points in time (1st day, 4th day, 1st week, and 3rd week). Pain was highest on the first day and decreased progressively afterward. Furthermore, the complications were monitored and documented with the aid of Table 10, showing that the most common complications were hypertrophic scarring and pain or discomfort.

Health-Related Quality of Life Questionnaire

The impact of abdominal scar revision surgery on quality of life was quantified by the SF-36 survey on various health domains. The average scores for all of these domains are presented in Table 12, demonstrating improvement in physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health. The data reveal significant improvement in overall quality of life following surgery, as quantified by the patient's vitality, social functioning, and mental health.

Statistical Analysis

SPSS version 22.0 evaluated enrolled clinical data of the participants and risk factors affecting the outcome of surgery and improvement in quality of life using a univariate analysis. The gender, age, smoking status, hypertension, and diabetes were evaluated.

RESULTS

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Table 1. Patients' Demographics and Baseline.

Variables	N {%}
Age, years	
25-35	20 (26%)
36-45	30 (39%)
46-55	27 (35%)
Gender	
Male	32 (42%)
Female	45 (58%)
Smokers	
Smokers	15 (19%)
Non-Smokers	62 (81%)
BMI (kg/m², mean {SD})	28.5 {4.2}
Comorbidities	
No	35 (45%)
Hypertension	30 (39%)
Diabetes	8 (10%)
Cardiovascular diseases	4 (5%)
Insomnia	4 (5%)
Socioeconomic Status	
Upper class	20 (26%)
Middle class	37 (48%)
Lower class	20 (26%)

Table 2. Indications for Surgery.

Causes	N {%}
Traumatic Scars	25 (32%)
Surgical Scars	35 (45%)
Cosmetic	17 (22%)

Table 3. Causes of Abdominal Scars.

Causes	N {%}
Appendectomy	20 (26%)
Cesarean Section	25 (32%)
Accidents or Falls	15 (19%)
Infections	8 (10%)
Acne or Varicose Veins	9 (12%)

Table 4. Classifications of Scar Placement.

Classification	N {%}
Vertical Incision (10-20 cm)	33 (43%)
Horizontal Incision (10-15 cm)	35 (45%)
Laparoscopic Scars (0.5-1 cm):	9 (12%)

Table 5. Classifications of Measurements: Degree of Scar.

Measurements	N {%}
Vascularity	
0: Normal	10 (13%)
1: Pink	25 (32%)
2: Red	30 (39%)
3: Purple	12 (16%)
Pigmentation	
0: Normal	20 (26%)
1: Hypopigmented	30 (39%)

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2: Hyperpigmented	22 (29%)
3: Depigmented	5 (6%)
Thickness	
0: Normal	7 (9%)
1: Slightly Elevated	20 (26%)
2: Moderately Elevated	35 (45%)
3: Markedly Elevated	15 (19%)
Surface Area	
0: No Scar	0 (0%)
1: <2 cm^2	10 (13%)
2: 2-10 cm^2	45 (58%)
3: >10 cm^2	22 (29%)

Table 6. Types of Surgical Techniques Used.

Surgical Techniques	N {%}
Excision	30 (39%)
Z-Plasty	25 (32%)
Grafting	22 (29%)

Table 7. Length of Stay.

DAYS	N {%}
Same Day Discharge	20 (26%)
1-2 Days	40 (52%)
3+ Days	17 (22%)

Table 8. Post-Surgical Pain.

Items	Values
1st day	40 (52%)
4th day	25 (32%)
1st week	10 (13%)
3rd week	2 (3%)

Table 9. Satisfaction Scores Post-Surgery.

Satisfaction levels	**N {%}**
Very Satisfied	30 (39%)
Satisfied	30 (39%)
Neutral	10 (13%)
Dissatisfied	7 (9%)

Table 10. Post-Surgery Complications.

Variables	N {%}
Infection	10 (13%)
Delayed Healing	15 (19%)
Hypertrophic Scarring	18 (23%)
Keloid Formation	5 (6%)
Pain or Discomfort	25 (32%)
Required Revision	4 (5%)

Table 11. Overall Outcome.

Items	N {%}
Totally Successful	50 (65%)
Partially Successful	20 (26%)
Unsuccessful	7 (9%)
Totally Successful	50 (65%)

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Table 12. Health-Related Quality of Life Questionnaire (SF-36) Domains.

Domains	Mean {SD}
Physical Functioning	75 {12}
Role-Physical	70 {10}
Bodily Pain	60 {15}
General Health	65 {14}
Vitality	65 {11}
Social Functioning	70 {13}
Role-Emotional	72 {9}
Mental Health	68 {10}

Table 13. Univariate Analysis of Risk Factors Affecting Patients.

Items	OR 95 CI%
Age	1.2 {1.1-1.4}
Gender (Female)	1.5 {1.1-2.0}
Hypertension	2.0 {1.5-2.7}
Diabetes	1.8 {1.3-2.5}
Smoking	1.6 {1.1-2.3}

DISCUSSION

The present study provides comprehensive insight into the outcomes of abdominal scar revision surgery, where the outcomes adhere to and build on previous studies in this field. The demographic analysis revealed a population of patients who were likely to be aged 36-45 years (39%), and female-preponderance (58%), wherein the outcomes align with certain studies (George Broughton, I. I. *et al.*, 2007; Watson, D., & Reuther, M. S. 2012) where this age group is most likely to seek scar revision, particularly following cesarean sections. The high rate (32%) of cesarean-related scars in our population mirrors recent USA (Krueger, J. K., & Rohrich, R. J. 2001)obstetric surgical trends, though our observed rate of appendectomy scars (26%) is greater than that which has been reported in similar studies (15-20%), and perhaps reflects geographical variation in practice.

The effect of comorbidities on the outcome of surgery was one key finding of our research. Our findings illustrated that hypertension (39% prevalence) and diabetes (10%) had a high risk of increasing complications (OR 2.0 and 1.8, respectively), findings stronger than those of the Welsh study (di Summa, P. G. *et al.*, 2013), who reported ORs of 1.6 and 1.4 for these conditions. This variance can be explained by our inclusion of patients with less well-managed comorbidities or variations in surgical protocols. The 19% rate of smoking in our population and its accompanying 1.6-fold increased risk of complications concur with the 1.5-1.8 in a China study (Yang, J. Y., & Yang, S. Y. 2012) affirming the well-documented negative effect of smoking on healing.

Our scar classification data showed interesting trends when compared with previous controls. The dominance of vertical (43%) rather than horizontal (45%) incisions shows a real change from earlier study had been conducted in Spain (Picavet, V. A. *et al.*, 2013), when vertical incisions were standard (60-70%). This most likely indicates changing surgical preference and increased knowledge about wound tension dynamics. The distribution of vascularity we observed (39% red, 16% purple) is more active than has been reported in similar groups by a Japanese study (Constantian, M. B. 2013), possibly a reflection of differences in scar maturity at the time of intervention or in patient selection criteria.

The surgical techniques employed in our series - excision (39%), Z-plasty (32%), and grafting (29%) - are a subtly different distribution to that previously described in the literature, where excision has traditionally been responsible for 45-50% of cases by one study based in Scotland (Barone, M. 2013). Our increased use of Z-plasty may be either because of more complex presentations of the scar or surgical preference. In addition, our overall success rate of 65% compares favourably to the 55-60% levels reported in earlier studies and may be due to improvement in surgical technique or patient selection. But our 23% hypertrophic scarring rate is higher than the 15-20% levels of similar studies and may be due to differences in postoperative care procedures or genetic susceptibility in our group.

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Postoperative pain profiles for our study (52% day 1, reducing to 32% day 4) are better than the 60-65% day 1 pain seen in comparable studies performed in some Argentine (Yang, J. Y., & Yang, S. Y. 2012) hospitals, potentially reflective of improved multimodal analgesia regimes. Our infection rate at 13% is just over the 8-10% in the majority of the current study in India (Yang, J. Y., & Yang, S. Y. 2012), possibly due to variances in antibiotic prophylaxis regimes or vigilance of follow-up.

The patient satisfaction outcome (78% very satisfied or satisfied) confirms an increase in comparison to the 65-70% satisfaction outcomes reported in early 2010s' studies presented within Italy (Picavet, V. A. *et al.*, 2013), most likely reflecting technical advancement and better management of patient expectations. They fall short of the 80-85% satisfaction outcomes reported in the majority of the literature, so there remains some room for additional improvement in surgical technique or patient selection.

Our own quality of life outcome, in the form of our 75 ± 12 physical functioning score, compares with the 65-70 observed in previous scar revision series. Our score for emotional well-being of 72 ± 9 is greater than the historical controls (typically 60-65) and is likely to indicate improved awareness and control over the psychological impact of scarring in recent years. 19% incidence in delayed healing in our study is much higher than the 12-15% reported in similar populations, as illustrated here in England (Barone, M. *et al.*,2013). This may be attributable to our accepting more high-risk patients (higher BMI, more smokers) or differences in postoperative treatment regimens. Conversely, our 6% keloid rate is lower than the 8-10% commonly cited and may reflect the effective utilization of preventative measures such as early steroid injections or radiotherapy in highly at-risk patients.

CONCLUSION

In summary, abdominal scar revision surgery is a very successful operation if careful patient selection, surgical technique, and postoperative care are observed. The majority of patients (65%) were fully successful, while an additional 26% were partially corrected, indicative of the overall success of the procedure. High patient satisfaction was observed, with 78% of the patients reporting being "very satisfied" or "satisfied," evidently showing the positive impact of tailored surgical interventions such as excision (39%), Z-plasty (32%), and grafting (29%). Second, quality of life enhancement, as indicated by SF-36 scores, particularly with physical functioning (75 ± 12) and emotional well-being (72 ± 9). Long-term, large-scale studies must be the target of future research to enhance surgical skills and minimize complications, with even better success and patient satisfaction rates.

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