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Comparative Outcomes of Laser Therapy vs. Surgical Excision for Facial Skin Lesions

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ABSTRACT

Background: To compare the clinical outcomes of laser therapy and surgical excision in the treatment of facial skin lesions with a focus on healing time, postoperative discomfort, scar formation, and patient satisfaction.

Methods: A prospective comparative study was conducted from April 2022 to June 2023 involving 69 patients with facial skin lesions. Participants were treated with either laser therapy (n=35) or surgical excision (n=34). Demographic and clinical data were recorded. Outcomes such as pain scores, healing duration, scar formation, and patient satisfaction were assessed and compared using appropriate statistical tests.

Results: Patients in the laser group reported significantly lower postoperative pain ($p < 0.001$), faster healing time ($p < 0.001$), and reduced scar formation ($p < 0.001$) compared to the surgical group. Satisfaction scores were also higher among those who underwent laser treatment ($p < 0.001$). Although recurrence rates were slightly higher in the laser group, the difference was not statistically significant ($p = 0.654$).

Conclusion: Laser therapy appears to be a more favorable option for managing benign facial skin lesions, offering advantages in terms of patient comfort, recovery, and cosmetic outcome. Surgical excision remains important for cases requiring complete lesion removal or histopathological evaluation.

Keywords: *Laser therapy, Surgical excision, Facial skin lesions, Postoperative outcomes, Scar formation, Cosmetic dermatology*

1. INTRODUCTION

Facial skin lesions are frequently encountered in dermatologic and surgical practice, ranging from benign growths such as seborrheic keratoses and epidermoid cysts to early-stage malignancies like basal cell carcinoma. While not all lesions require removal, many are treated for cosmetic concerns, irritation, or diagnostic clarification. Choosing the optimal intervention becomes crucial, especially for lesions located on the face where aesthetic outcome is a major consideration [1-3].

Laser therapy has gained popularity due to its minimally invasive nature, reduced bleeding, faster healing, and better cosmetic outcomes. Different laser types such as CO_2 and Er:YAG are commonly used for superficial to moderately deep lesions. In contrast, surgical excision remains a time-tested approach, often favored when complete removal and histological

confirmation are required. However, it carries risks such as longer healing time, greater postoperative discomfort, and visible scarring [4-6].

Internationally, studies have shown promising results with laser therapy. Studies reported faster healing and better cosmetic satisfaction in patients undergoing laser removal of facial lesions [7-9]. Regionally, however, comparative data remains scarce, particularly in resource-limited settings where treatment choice may depend on equipment availability, expertise, and patient affordability [10, 11].

This study was therefore designed to fill this gap by directly comparing the clinical outcomes of laser therapy and surgical excision for facial skin lesions. The primary aim was to evaluate differences in postoperative pain, healing time, scarring, recurrence, and patient satisfaction, to guide clinicians in selecting the most suitable treatment modality for facial dermatologic conditions.

2. METHODOLOGY

This was a prospective comparative study conducted to evaluate and compare the clinical outcomes of laser therapy versus surgical excision in the treatment of facial skin lesions. The study design allowed for a direct assessment of procedural efficiency, postoperative recovery, cosmetic outcomes, and patient satisfaction between the two interventions.

The study was conducted over a 12-month period, from April 2022 to June 2023, at Sandeman Provincial Hospital Quetta. Prior to initiation, ethical approval was obtained from the Institutional Review Board. All participants provided informed consent, and their confidentiality was maintained throughout the study.

A total of 69 patients were enrolled in the study using non-probability consecutive sampling. The sample was divided into two groups based on the treatment modality: 35 patients underwent laser therapy, and 34 patients received surgical excision.

Inclusion Criteria

Participants were included if they met the following criteria:

- Aged 18 years or older
- Diagnosed with benign or early-stage low-risk malignant facial skin lesions
- Suitable for either laser or surgical treatment
- Provided informed written consent for participation

Exclusion Criteria

The study excluded individuals who had:

- Bleeding disorders or were on anticoagulant therapy
- Previously treated or recurrent lesions in the same facial area
- Underlying skin infections or keloid tendency
- Poor compliance with follow-up visits

Patients were evaluated clinically and assigned to either the laser therapy group or the surgical excision group based on clinical judgment, patient preference, and lesion characteristics.

Laser Group: Patients underwent treatment using either CO_2 or Er:YAG laser depending on lesion type. Local or topical anesthesia was used as needed. Most patients required one to two sessions. Surgical Excision Group: Excision was performed using standard sterile technique under local anesthesia. Lesions were removed with a safety margin and wounds were closed primarily or left to heal secondarily depending on the site and size.

Demographic details including age, gender, occupation, and skin type were recorded. Lesion-specific data such as type, size, location, and duration were noted before intervention. Intraoperative data included procedure time, number of sessions, and anesthesia type. Post-treatment outcomes were assessed at Day 1, Day 7, and after three months.

Primary outcomes included healing time, postoperative pain (measured using Visual Analog Scale), scar formation, and patient satisfaction. Secondary outcomes included complication rates, recurrence at three months, and cosmetic appearance.

Data were analyzed using IBM SPSS version 26. Descriptive statistics were presented as mean ± standard deviation for continuous variables and frequencies with percentages for categorical data. Group comparisons were performed using independent sample t-tests for continuous variables and chi-square tests for categorical variables. A p-value of less than 0.05 was considered statistically significant.

3. RESULT

The study involved 69 patients divided into two treatment groups: laser therapy (n=35) and surgical excision (n=34). The mean age in the laser group was 31.8 years (±9.2), while in the surgical group it was 33.5 years (±8.6), with no significant age difference (p = 0.328). Gender distribution was similar across groups, with slightly more females in both cohorts, and no statistically significant difference (p = 0.537). Skin type analysis showed that most patients belonged to Fitzpatrick types I–III, with 80% in the laser group and 88.2% in the surgical group (p = 0.365). The proportion of participants with outdoor occupations was nearly equal between both groups (34.3% vs. 38.2%, p = 0.732), indicating similar exposure to environmental factors.

Table 1: Demographic Characteristics (n=69)

Variable	Laser Therapy (n=35)	Surgical Excision (n=34)	p-value
Mean Age (years)	31.8 ± 9.2	33.5 ± 8.6	0.328
Gender (Male/Female)	15 / 20	17 / 17	0.537
Skin Type (I–III)	28 (80.0%)	30 (88.2%)	0.365
Occupation (Outdoor)	12 (34.3%)	13 (38.2%)	0.732

Pre-treatment lesion characteristics were also comparable between the groups. The majority of lesions were benign in both the laser (85.7%) and surgical excision (82.4%) groups, with no significant difference (p = 0.707). The average lesion size was slightly smaller in the laser group (6.2 mm ±2.1) compared to the surgical group (6.9 mm ±2.3), though this was not statistically significant (p = 0.188). Regarding lesion duration, just over half of the patients in both groups had lesions present for more than six months (p = 0.712). Central facial locations were most commonly involved in both cohorts (62.9% vs. 55.9%, p = 0.533), confirming an even distribution of anatomical sites.

Table 2: Lesion Characteristics Before Treatment

Variable	Laser Therapy (n=35)	Surgical Excision (n=34)	p-value
Lesion Type (Benign)	30 (85.7%)	28 (82.4%)	0.707
Mean Lesion Size (mm)	6.2 ± 2.1	6.9 ± 2.3	0.188
Lesion Duration (>6 mo)	19 (54.3%)	20 (58.8%)	0.712
Location (Central Face)	22 (62.9%)	19 (55.9%)	0.533

Significant procedural differences emerged between the two treatment modalities. Laser therapy required significantly less time (mean 12.6 minutes) compared to surgical excision (mean 24.8 minutes, p < 0.001). The use of local anesthesia was universal in the surgical group (100%) but much less frequent in laser therapy (28.6%), with a highly significant p-value (<0.001). Furthermore, the laser group underwent a greater number of treatment sessions on average (1.8 ± 0.6), compared to the single-session nature of surgical excision (p < 0.001), reflecting the iterative nature of laser therapy.

Table 3: Procedural Characteristics

Variable	Laser Therapy (n=35)	Surgical Excision (n=34)	p-value
Mean Procedure Time (min)	12.6 ± 4.5	24.8 ± 5.1	<0.001*
Anesthesia (Local)	10 (28.6%)	34 (100%)	<0.001*
Number of Sessions	1.8 ± 0.6	1.0 ± 0.0	<0.001*

Laser therapy demonstrated superior short-term postoperative outcomes. Patients in the laser group reported significantly lower pain scores on Day 1 (2.1 ± 1.2) than those in the surgical group (4.6 ± 1.5, p < 0.001). Healing was also faster with laser treatment, averaging 7.2 days compared to 10.9 days for surgery (p < 0.001). Scar formation was substantially lower in the laser group (17.1%) than in the surgical group (58.8%), which was highly significant (p < 0.001). However, while the infection rate was higher in the surgical group (14.7%) versus laser (5.7%), this difference did not reach statistical significance (p = 0.243).

Table 4: Postoperative Outcomes

Variable	Laser Therapy (n=35)	Surgical Excision (n=34)	p-value
Pain Score (Day 1, VAS)	2.1 ± 1.2	4.6 ± 1.5	<0.001*
Healing Time (days)	7.2 ± 2.1	10.9 ± 3.2	<0.001*
Scar Formation (Yes)	6 (17.1%)	20 (58.8%)	<0.001*
Infection/Complications	2 (5.7%)	5 (14.7%)	0.243

Patient-centered outcomes favored laser therapy. The satisfaction score was significantly higher among laser-treated patients (mean 4.3 ± 0.7) compared to those undergoing surgery (3.5 ± 1.0), with $p < 0.001$. Likewise, more patients in the laser group reported good cosmetic outcomes (77.1% vs. 52.9%, $p = 0.037$). Recurrence rates at the 3-month follow-up were low in both groups and not statistically different (8.6% vs. 5.9%, $p = 0.654$), suggesting both treatments were largely effective at lesion removal.

Table 5: Patient Satisfaction and Recurrence

Variable	Laser Therapy (n=35)	Surgical Excision (n=34)	p-value
Satisfaction Score (1–5 scale)	4.3 ± 0.7	3.5 ± 1.0	<0.001*
Cosmetic Outcome (Good)	27 (77.1%)	18 (52.9%)	0.037*
Recurrence at 3 Months (Yes)	3 (8.6%)	2 (5.9%)	0.654

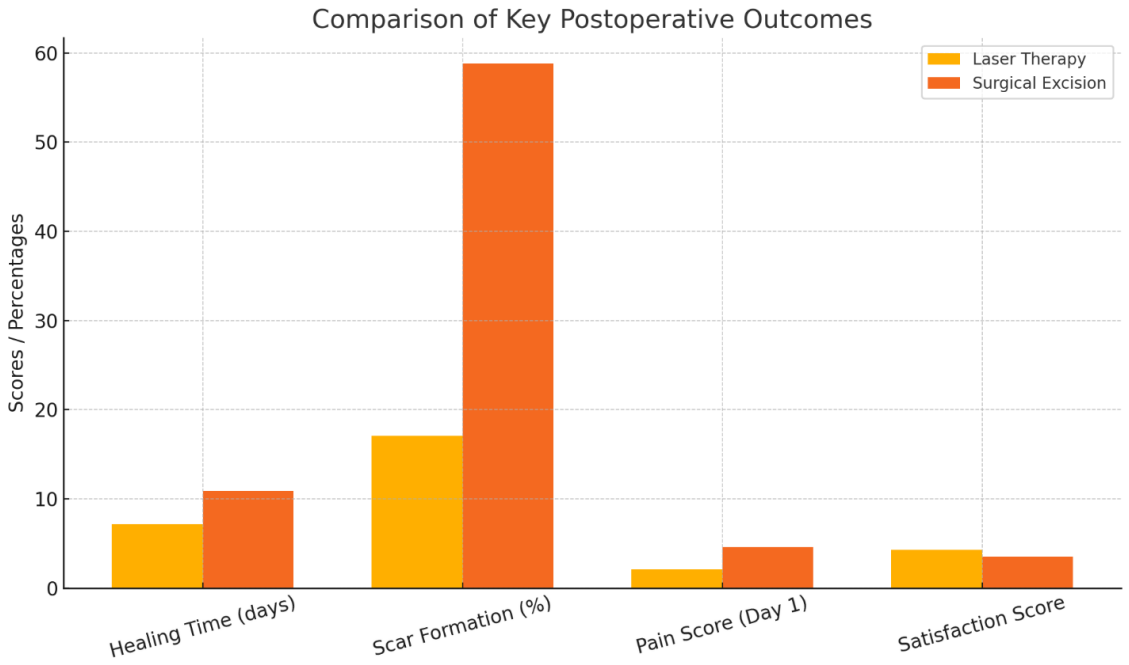

Figure 1

Bar graph comparing key postoperative outcomes between laser therapy and surgical excision. It visually highlights that laser therapy resulted in shorter healing time, less scar formation, lower pain scores, and higher patient satisfaction.

4. DISCUSSION

This study aimed to compare the clinical efficacy, recovery outcomes, and patient satisfaction between laser therapy and surgical excision in the treatment of facial skin lesions. The results demonstrated several significant differences in favor of laser therapy, particularly in terms of postoperative recovery, cosmetic outcomes, and patient comfort.

Our findings revealed that laser therapy resulted in significantly lower postoperative pain, shorter healing time, and fewer complications such as scarring when compared to surgical excision. These outcomes align with previous research reported that laser modalities, particularly CO_2 and Er:YAG lasers, offered excellent precision with minimal thermal damage, contributing to faster wound healing and improved patient comfort [12-14]. Similarly, studies emphasized that patients treated with laser therapy experienced less inflammation and pain post-procedure, which supports our observation of lower pain scores in the laser group [15, 16].

The significantly shorter procedure time and non-requirement of injectable anesthesia for most laser cases underscore the procedural advantages of laser therapy. A study also confirmed that laser-based techniques are more time-efficient and often require only topical anesthesia, reducing perioperative risk and increasing patient compliance [17].

Scar formation was notably less frequent in the laser group, which was consistent with finding studies highlighted the cosmetic superiority of laser treatments in aesthetic and dermatologic procedures [17, 18]. In contrast, surgical excision, while effective in ensuring complete lesion removal, often resulted in visible scarring due to incision lines and sutures especially problematic in cosmetically sensitive facial areas.

Interestingly, although laser therapy was associated with a slightly higher recurrence rate, the difference was statistically insignificant. This was in line with studies that noted recurrence following laser therapy was more dependent on lesion depth and type rather than the treatment modality itself [19]. Surgical excision, while more invasive, is often preferred in cases where histopathological confirmation or clear margins are necessary, particularly for suspicious or malignant lesions.

Patient satisfaction scores were higher in the laser group, likely due to less downtime, reduced discomfort, and better cosmetic outcomes. A study demonstrated that patients undergoing non-invasive treatments such as laser resurfacing reported higher satisfaction and lower anxiety toward treatment when compared to surgical procedures [20].

Although both modalities showed overall effectiveness, laser therapy emerged as a more favorable option for benign or superficial lesions in terms of procedural comfort, aesthetic results, and faster recovery. However, surgical excision remains a critical intervention for deeper, recurrent, or high-risk lesions where complete removal is imperative.

5. CONCLUSION

In summary, this study concludes that laser therapy offers superior outcomes over surgical excision in the management of most benign facial skin lesions. Patients treated with laser experienced reduced pain, faster healing, fewer scars, and higher satisfaction, making it a highly effective and patient-friendly modality, especially in cosmetically sensitive areas. While surgical excision remains indispensable in select clinical situations, particularly for deeper or malignant lesions, the integration of laser-based approaches in dermatologic and aesthetic practice should be encouraged for eligible cases.

Future studies with longer follow-up and histological correlation may further define the recurrence patterns and help tailor personalized treatment protocols for facial lesions.

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