**Original Research**

# Comparative Outcomes of Traditional vs. Arthroscopic Surgery in Shoulder and Knee Injuries

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**Abstract**

**Aim:** This study aims to compare the outcomes of traditional open surgery and arthroscopic surgery in the management of shoulder and knee injuries, focusing on surgical duration, intraoperative blood loss, postoperative pain, recovery, functional outcomes, and patient satisfaction.

**Materials and Methods:** A prospective comparative study was conducted on 100 patients with rotator cuff tears, meniscal injuries, ligament injuries (ACL tears), or labral tears requiring surgical intervention. Patients were randomly assigned into two groups: Group A (n = 50) underwent traditional open surgery, while Group B (n = 50) underwent arthroscopic surgery. All procedures were performed by experienced orthopedic surgeons. Postoperative assessments included pain scores (VAS), range of motion (ROM), functional scores (Lysholm Knee Score and Constant-Murley Shoulder Score), complication rates, hospital stay, return to daily activities, and patient satisfaction scores. Statistical analysis was performed using SPSS, with a p-value of <0.05 considered statistically significant.

**Results:** The arthroscopic surgery group showed significantly better outcomes in multiple parameters. Surgical duration was shorter (55 ± 10.3 min vs. 85 ± 12.5 min, p = 0.001), and intraoperative blood loss was lower (100 ± 25 ml vs. 250 ± 40 ml, p = 0.002). Postoperative pain scores at 24 hours and 2 weeks were significantly lower in Group B (p = 0.0001, p = 0.0005, respectively). Hospital stay was shorter (2.1 ± 0.6 days vs. 4.2 ± 0.8 days, p = 0.002). At 6 months, functional recovery was superior in the arthroscopy group (Lysholm Knee Score: 88 ± 5.2 vs. 78 ± 6.5, p = 0.001; Constant-Murley Score: 85 ± 6.1 vs. 72 ± 5.8, p = 0.0005). Return to daily activities was earlier in Group B (6 ± 1.8 weeks vs. 10 ± 2.3 weeks, p = 0.002). Patient satisfaction was significantly higher in the arthroscopy group (8.9 ± 1.0 vs. 7.1 ± 1.2, p = 0.001), while the complication rate was lower (5% vs. 12%, p = 0.04).

**Conclusion:** Arthroscopic surgery provides superior outcomes compared to traditional open surgery, with shorter operative times, reduced intraoperative blood loss, less postoperative pain, faster recovery, and improved functional outcomes. Additionally, it is associated with higher patient satisfaction and lower complication rates, making it a preferred surgical approach for shoulder and knee injuries.

**Keywords:** Arthroscopic surgery, Traditional open surgery, Shoulder injuries, Knee injuries, Postoperative outcomes



## Introduction

In modern orthopedic practice, surgical interventions play a crucial role in restoring mobility, alleviating pain, and improving the quality of life for patients suffering from shoulder and knee injuries. Among the various surgical approaches, traditional open surgery and arthroscopic techniques represent two distinct paradigms, each with its advantages and limitations. The choice between these methods depends on multiple factors, including the severity of the injury, the patient's overall health, and the expected recovery trajectory. With advancements in medical technology, arthroscopic surgery has gained prominence due to its minimally invasive nature, but traditional open surgery continues to be preferred in complex cases where direct visualization and repair are essential. This paper examines and compares the outcomes of traditional open surgery versus arthroscopic procedures for shoulder and knee injuries, highlighting their impact on post-operative recovery, pain management, functional outcomes, and long-term prognosis.[1]

The shoulder and knee joints are among the most commonly injured areas of the musculoskeletal system, affecting individuals across various age groups and activity levels. These injuries may result

from sports activities, occupational hazards, degenerative conditions, or traumatic incidents. The complexity of these joints, combined with their significant functional role, makes surgical intervention a critical consideration when conservative treatments fail to provide adequate relief. Historically, traditional open surgery was the gold standard for treating severe ligament tears, rotator cuff injuries, meniscus damage, and other joint-related conditions. However, with the development of arthroscopic techniques, surgeons have been able to offer a less invasive alternative that reduces surgical trauma and promotes faster recovery.[2]

Traditional open surgery involves making a large incision to access the joint directly, allowing the surgeon to perform extensive repairs with a clear view of the affected structures. This approach is particularly beneficial in cases requiring complex reconstructions, such as severe rotator cuff tears or complete ligament ruptures in the knee. The ability to directly manipulate the joint structures gives surgeons a high degree of control, ensuring precise repairs and long-term stability. However, the larger incision, increased tissue disruption, and longer hospital stays associated with open surgery often lead to extended recovery times and higher risks of complications such as infections, stiffness, and prolonged post-operative pain.[3]

In contrast, arthroscopic surgery employs small incisions through which a tiny camera (arthroscope) and specialized instruments are inserted to diagnose and treat joint injuries. This minimally invasive technique has revolutionized orthopedic surgery by significantly reducing post-operative pain, minimizing tissue damage, and accelerating recovery. The arthroscopic approach is widely used for procedures such as meniscus repairs, anterior cruciate ligament (ACL) reconstructions, rotator cuff repairs, and removal of loose bodies within the joint. Patients undergoing arthroscopic surgery typically experience shorter hospital stays, faster rehabilitation, and a quicker return to daily activities compared to those undergoing traditional open procedures. However, arthroscopy has its own limitations, including restricted visualization, technical challenges, and the potential for incomplete repairs in cases of severe joint damage.One of the key aspects of comparing these surgical techniques is their impact on post-operative rehabilitation and functional outcomes. Patients who undergo arthroscopic surgery often benefit from early mobilization and shorter recovery timelines, which are crucial for athletes and physically active individuals aiming to regain full joint function as quickly as possible. On the other hand, traditional open surgery, while more invasive, may provide better long-term stability in cases where significant reconstruction is required. Additionally, the risk of complications such as joint stiffness or residual pain may vary depending on the chosen technique, with some studies suggesting that open surgery has a slightly higher incidence of post-operative stiffness due to extensive tissue manipulation.[4]

Another important consideration in evaluating these surgical methods is pain management. Arthroscopic procedures are generally associated with reduced post-operative pain due to the minimally invasive approach, which preserves surrounding soft tissues. This allows for earlier rehabilitation and reduces the need for prolonged use of pain medications. Traditional open surgery, on the other hand, often results in greater post-operative discomfort due to the larger incisions and more extensive soft tissue dissection. Effective pain management strategies, including multimodal analgesia and physical therapy, play a crucial role in optimizing recovery outcomes regardless of the chosen surgical approach.[5]

Long-term outcomes following surgical intervention for shoulder and knee injuries depend on factors such as joint stability, functional mobility, and the prevention of re-injury. Arthroscopic surgery, while effective in many cases, may have a higher risk of incomplete repairs or the need for revision surgery if initial treatment is insufficient. Traditional open surgery, despite its longer recovery period, may offer superior long-term durability in complex cases where extensive reconstruction is necessary. Patient-specific factors, including age, activity level, and underlying joint health, also influence the success of each surgical technique.

The decision to opt for traditional open surgery or arthroscopic intervention ultimately rests on a careful evaluation of the injury's severity, the surgeon's expertise, and the patient's rehabilitation goals. While arthroscopy has revolutionized orthopedic surgery by offering a minimally invasive option with faster recovery, traditional open surgery remains indispensable for cases requiring extensive reconstruction. As surgical techniques continue to evolve, the integration of advanced imaging, robotic-assisted procedures, and regenerative medicine may further enhance the effectiveness of both approaches.

**Materials and Methods**

This study was conducted to compare the outcomes of traditional open surgery and arthroscopic surgery in the management of shoulder and knee injuries. A total of 100 patients diagnosed with significant shoulder or knee injuries requiring surgical intervention were included in the study. Patients were recruited from a tertiary care hospital over a period of 12 months, and written informed consent was obtained from all participants.

The patients were randomly assigned into two groups: Group A (n = 50) underwent traditional open surgery, while Group B (n = 50) underwent arthroscopic surgery. The inclusion criteria comprised individuals aged 18 to 60 years, diagnosed with rotator cuff tears, meniscal injuries, ligament injuries (such as ACL tears), or labral tears confirmed by MRI and clinical examination. Patients with severe osteoarthritis

requiring joint replacement, systemic infections, or significant comorbidities affecting surgical outcomes were excluded from the study.

All surgeries were performed by experienced orthopedic surgeons under general or regional anesthesia. The traditional open surgeries followed standard procedures with larger incisions, direct visualization, and manual repair of the injured structures. In contrast, arthroscopic surgeries were performed using minimally invasive techniques, involving small incisions, a fiber-optic camera, and specialized instruments for repair. The duration of surgery, intraoperative complications, and post-surgical pain levels were recorded.

Postoperative care included standardized pain management, physiotherapy, and follow-up assessments at 2 weeks, 6 weeks, 3 months, and 6 months. Primary outcome measures included pain scores (VAS scale), range of motion (ROM), functional recovery (assessed using the Lysholm Knee Score and the Constant-Murley Shoulder Score), and complication rates. Secondary outcomes included hospital stay duration, return to daily activities, and patient satisfaction scores.

Statistical analysis was performed using SPSS software, and comparative outcomes between the two groups were evaluated using independent t-tests and chi-square tests for continuous and categorical variables, respectively. A p-value of $<0.05$ was considered statistically significant.

## Results

### Table 1: Demographic and Baseline Characteristics

The demographic characteristics of patients in both groups were comparable. The mean age was similar between Group A (Traditional Open Surgery: 45.3 ± 5.2 years) and Group B (Arthroscopic Surgery: 44.8 ± 5.0 years), with a p-value of 0.72, indicating no statistically significant difference. Similarly, the proportion of males (30 ± 5.6% vs. 32 ± 5.4%) and females (20 ± 4.8% vs. 18 ± 4.5%) was balanced between the two groups (p-values: 0.81 and 0.76, respectively). The mean BMI (Body Mass Index) was 26.1 ± 3.2 kg/m² in Group A and 25.9 ± 3.1 kg/m² in Group B (p = 0.65), suggesting that body composition did not influence the surgical outcomes. The lack of significant differences in these baseline characteristics suggests that both groups were comparable at the start of the study, ensuring a fair assessment of surgical outcomes.

### Table 2: Intraoperative Outcomes

Intraoperative parameters showed a significant advantage for arthroscopic surgery over traditional open surgery. The mean surgery duration was significantly shorter in Group B (55 ± 10.3 minutes) compared to Group A (85 ± 12.5 minutes) (p = 0.001). This reflects the less invasive nature of arthroscopic procedures, which typically require smaller incisions and minimal soft tissue disruption.

Similarly, intraoperative blood loss was significantly lower in the arthroscopic group (100 ± 25 ml) compared to the traditional surgery group (250 ± 40 ml, p = 0.002). This is expected, as open surgery involves larger incisions, leading to more soft tissue dissection and higher blood loss.

The complication rate was also higher in traditional open surgery (10 ± 3.2%) compared to arthroscopic surgery (4 ± 2.1%) (p = 0.03). The lower complication rate in arthroscopy can be attributed to the minimally invasive approach, which reduces the risk of infection, wound healing issues, and excessive scarring.

### Table 3: Postoperative Pain and Recovery

Postoperative recovery was significantly better in the arthroscopic surgery group. The VAS pain score at 24 hours postoperatively was 6.8 ± 1.2 in Group A and 4.2 ± 1.0 in Group B (p = 0.0001), indicating significantly less pain in the arthroscopic group. Similarly, the VAS pain score at 2 weeks postoperatively was 4.5 ± 1.0 in Group A compared to 2.3 ± 0.9 in Group B (p = 0.0005), suggesting faster pain resolution in arthroscopy patients.

Additionally, the hospital stay was significantly shorter for the arthroscopic surgery group (2.1 ± 0.6 days) compared to the open surgery group (4.2 ± 0.8 days) (p = 0.002). The minimally invasive nature of arthroscopy allows for faster recovery, reduced need for postoperative pain management, and earlier discharge.

### Table 4: Functional Outcomes at 6 Months

Functional recovery at 6 months postoperatively showed a statistically significant improvement in the arthroscopic surgery group. The Lysholm Knee Score, which assesses knee function, was higher in Group B (88 ± 5.2) compared to Group A (78 ± 6.5) (p = 0.001), indicating better knee functionality after arthroscopy.

Similarly, the Constant-Murley Shoulder Score, used to evaluate shoulder function, was 72 ± 5.8 in Group A and 85 ± 6.1 in Group B (p = 0.0005), demonstrating better shoulder function in arthroscopy patients.

Furthermore, patients in the arthroscopic surgery group were able to return to daily activities significantly earlier (6 ± 1.8 weeks) compared to the open surgery group (10 ± 2.3 weeks) (p = 0.002). This reflects the advantages of minimally invasive techniques in preserving joint function and reducing recovery time.

### Table 5: Patient Satisfaction and Complications

Patient satisfaction was significantly higher in the arthroscopic surgery group, with a mean satisfaction score of 8.9 ± 1.0 compared to 7.1 ± 1.2 in the open surgery group (p = 0.001). The lower pain levels,

quicker recovery, and better functional outcomes contributed to this improved satisfaction.

The complication rate was higher in the traditional surgery group (12 ± 3.5%) compared to the arthroscopy group (5 ± 2.3%) (p = 0.04), indicating a lower risk of postoperative complications with arthroscopic techniques. The reoperation rate was also lower in the arthroscopic group (2 ± 1.0%) compared to the open surgery group (5 ± 1.5%), although this difference was not statistically significant (p = 0.08).

**Table 1: Demographic and Baseline Characteristics (Mean ± SD)**

| Variable | Traditional Open Surgery (Group A) | Arthroscopic Surgery (Group B) | p-value |
|---|---|---|---|
| Mean Age (years) | 45.3 ± 5.2 | 44.8 ± 5.0 | 0.72 |
| Male (%) | 30 ± 5.6 | 32 ± 5.4 | 0.81 |
| Female (%) | 20 ± 4.8 | 18 ± 4.5 | 0.76 |
| Mean BMI (kg/m²) | 26.1 ± 3.2 | 25.9 ± 3.1 | 0.65 |

**Table 2: Intraoperative Outcomes (Mean ± SD)**

| Variable | Traditional Open Surgery (Group A) | Arthroscopic Surgery (Group B) | p-value |
|---|---|---|---|
| Mean Surgery Duration (minutes) | 85 ± 12.5 | 55 ± 10.3 | 0.001 |
| Intraoperative Blood Loss (ml) | 250 ± 40 | 100 ± 25 | 0.002 |
| Complications (%) | 10 ± 3.2 | 4 ± 2.1 | 0.03 |

**Table 3: Postoperative Pain and Recovery (Mean ± SD)**

| Variable | Traditional Open Surgery (Group A) | Arthroscopic Surgery (Group B) | p-value |
|---|---|---|---|
| VAS Pain Score (24h post-op) | 6.8 ± 1.2 | 4.2 ± 1.0 | 0.0001 |
| VAS Pain Score (2 weeks post-op) | 4.5 ± 1.0 | 2.3 ± 0.9 | 0.0005 |
| Hospital Stay (days) | 4.2 ± 0.8 | 2.1 ± 0.6 | 0.002 |

**Table 4: Functional Outcomes at 6 Months (Mean ± SD)**

| Variable | Traditional Open Surgery (Group A) | Arthroscopic Surgery (Group B) | p-value |
|---|---|---|---|
| Lysholm Knee Score (Mean) | 78 ± 6.5 | 88 ± 5.2 | 0.001 |
| Constant-Murley Shoulder Score (Mean) | 72 ± 5.8 | 85 ± 6.1 | 0.0005 |
| Return to Daily Activities (weeks) | 10 ± 2.3 | 6 ± 1.8 | 0.002 |

**Table 5: Patient Satisfaction and Complications (Mean ± SD)**

| Variable | Traditional Open Surgery (Group A) | Arthroscopic Surgery (Group B) | p-value |
|---|---|---|---|
| Patient Satisfaction Score (1-10) | 7.1 ± 1.2 | 8.9 ± 1.0 | 0.001 |
| Complication Rate (%) | 12 ± 3.5 | 5 ± 2.3 | 0.04 |
| Reoperation Rate (%) | 5 ± 1.5 | 2 ± 1.0 | 0.08 |

**Discussion**

The findings of this study suggest that arthroscopic surgery offers significant advantages over traditional open surgery for shoulder and knee injuries, particularly in terms of surgical duration, intraoperative blood loss, postoperative pain, recovery time, functional outcomes, and patient satisfaction.

The demographic characteristics of both groups were comparable, with no significant differences in age, gender distribution, or BMI. This indicates that the observed differences in surgical outcomes were not influenced by patient-related factors but rather by the surgical technique itself. Similar findings have been reported in previous studies, where age and BMI were not found to be significant predictors of postoperative recovery in arthroscopic and open surgeries (Gill et al., 2005; Brophy et al., 2009).[1,2]

The significantly shorter surgical duration in the arthroscopic group (55 ± 10.3 minutes) compared to the open surgery group (85 ± 12.5 minutes) (p = 0.001) aligns with findings from MacGillivray et al. (2006) and Kurtz et al. (2007), who reported that arthroscopy significantly reduces operative time due to smaller incisions and improved visualization.[3,4]

Additionally, intraoperative blood loss was significantly lower in the arthroscopy group (100 ± 25 ml) compared to the traditional open surgery group (250 ± 40 ml) (p = 0.002). This finding is consistent with the work of Frosch et al. (2010), who found that arthroscopic techniques minimize tissue trauma and reduce intraoperative hemorrhage, leading to better

hemostatic control.[5] The lower complication rate in arthroscopy (4 ± 2.1%) compared to open surgery (10 ± 3.2%) (p = 0.03) further supports this, as less invasive techniques tend to reduce the risks of infection, wound dehiscence, and deep vein thrombosis (Millett et al., 2006; Lubowitz et al., 2008).[6,7]

Postoperative pain was significantly lower in the arthroscopy group, with VAS pain scores of 4.2 ± 1.0 at 24 hours postoperatively compared to 6.8 ± 1.2 in the open surgery group (p = 0.0001). This is consistent with studies by Kirkley et al. (2008) and Howell et al. (2010), which demonstrated that arthroscopic surgery is associated with reduced postoperative pain due to the preservation of soft tissue integrity.[8,9]

Furthermore, hospital stay was significantly shorter in arthroscopy patients (2.1 ± 0.6 days) compared to open surgery patients (4.2 ± 0.8 days) (p = 0.002). This supports findings by Majeed et al. (2011), who showed that arthroscopic surgery reduces the length of hospital stay by facilitating early mobilization and reducing the need for extensive postoperative care.[10]

The functional assessment at six months demonstrated better outcomes in the arthroscopy group. The Lysholm Knee Score was significantly higher in the arthroscopic group (88 ± 5.2) compared to the open surgery group (78 ± 6.5) (p = 0.001), indicating better knee function. Similarly, the Constant-Murley Shoulder Score, which evaluates shoulder mobility, was 85 ± 6.1 in the arthroscopy group versus 72 ± 5.8 in the open surgery group (p = 0.0005). These findings are consistent with those reported by Yamaguchi et al. (2005) and Franke et al. (2009), who observed that arthroscopy facilitates faster restoration of joint function and strength.[11,12]

Moreover, the return to daily activities was significantly faster in the arthroscopy group (6 ± 1.8 weeks) compared to the open surgery group (10 ± 2.3 weeks) (p = 0.002). This is in agreement with the work of Cole et al. (2007), who noted that patients who underwent arthroscopic procedures returned to work and sports earlier due to less postoperative stiffness and reduced soft tissue damage.[13]

Patient satisfaction was higher in the arthroscopy group (8.9 ± 1.0) compared to the open surgery group (7.1 ± 1.2) (p = 0.001), which is consistent with the results of Wright et al. (2006), who found that patients preferred minimally invasive procedures due to faster recovery, less scarring, and improved postoperative mobility.[14]

The complication rate was significantly lower in arthroscopic surgery (5 ± 2.3%) compared to open surgery (12 ± 3.5%) (p = 0.04), supporting findings by Baumgarten et al. (2009).[15] The reoperation rate was also lower in the arthroscopy group (2 ± 1.0%) compared to the open surgery group (5 ± 1.5%), though the difference was not statistically significant (p = 0.08). This suggests that arthroscopic surgery provides long-term stability and reduces the likelihood of revision surgery, findings that align with Parsons et al. (2012).[16]

## Conclusion

This study demonstrates that arthroscopic surgery offers significant advantages over traditional open surgery for shoulder and knee injuries, including shorter surgical duration, reduced intraoperative blood loss, lower postoperative pain, faster recovery, and better functional outcomes. Patients undergoing arthroscopy reported higher satisfaction rates and lower complication risks compared to open surgery. These findings align with previous research supporting minimally invasive techniques as the preferred approach in orthopedic surgery.

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