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RESEARCH ARTICLE

Ambulatory Reverse Shoulder Arthroplasty in a Medium-Complexity Orthopedic Center: Early Outcomes of a Structured Multidisciplinary Clinical Pathway

Andrés Arismendi. MD. Orthopedic surgeon[1], Carlos Afanador. MD. Orthopedic surgeon[1], Ana Maria Arcila. MD.[2], Juan José Diaz. MD.[2], Ana Milena Herrera Torres. MD. MSc. Ph.D.[3*]

[1]Arm and Shoulder Orthopedics. Clínica del Campestre. Medellín. Colombia
[2]General medicine. Clínica del Campestre. Medellín. Colombia
[3]Department of epidemiology and clinical research. Clínica del Campestre. Medellín. Colombia

[*]milenaherrera@clinicadelcampestre.com

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ABSTRACT

Background: Reverse shoulder arthroplasty (RSA) has traditionally been performed with inpatient postoperative observation because of concerns regarding perioperative complications, postoperative pain control, and early functional recovery. However, improvements in perioperative management and patient selection have enabled the expansion of shoulder arthroplasty into ambulatory settings. Although several studies have reported favorable outcomes following outpatient shoulder arthroplasty, less attention has been given to the specific clinical pathways that support safe implementation of ambulatory RSA.

Purpose: To evaluate the early clinical outcomes of patients undergoing ambulatory reverse shoulder arthroplasty within a structured multidisciplinary clinical pathway emphasizing careful patient selection, opioid-sparing multimodal anesthesia, early supervised rehabilitation, and close postoperative follow-up.

Methods: A prospective observational cohort study was conducted including consecutive patients who underwent ambulatory RSA performed by two shoulder surgeons between February 2024 and December 2025 at a specialized orthopedic center. Patient eligibility followed strict clinical and social selection criteria designed to ensure safe same-day discharge. Perioperative management incorporated multimodal regional anesthesia and opioid-sparing analgesia protocols. Postoperative recovery included early supervised home-based physiotherapy and proactive monitoring through nurse visits, telephone follow-up, and scheduled clinical assessments. Outcomes evaluated included postoperative complications, pain trajectories measured using the Visual Analog Scale (VAS), and functional recovery assessed with the American Shoulder and Elbow Surgeons (ASES) score during a 90-day follow-up period.

Results: Thirty-four patients, mostly females (64.7%), underwent ambulatory RSA. The mean age was 70.9 ± 11.2 years. Surgical indications included glenohumeral arthrosis, massive rotator cuff tear, and chronic shoulder dislocation. All patients were classified as ASA II. Regional anesthesia consisted of an interscalene block or a brachial plexus block. Postoperative analgesia was managed with an elastomeric infusion pump or a transdermal buprenorphine patch. Il procedures were successfully completed with same-day discharge following the institutional ambulatory arthroplasty protocol. At the final follow-up, pain and functional outcomes improved significantly compared with preoperative values ($p = 0.004$ and 0.019, respectively). No complications, readmissions, reoperations, or infections occurred during the 90-day follow-up period.

Conclusions: Ambulatory reverse shoulder arthroplasty can be performed safely in carefully selected patients when supported by a structured multidisciplinary clinical pathway that includes multimodal opioid-sparing anesthesia, early supervised rehabilitation, and proactive postoperative monitoring. This approach resulted in excellent pain control and marked early functional improvement without complications in this cohort.

Keywords: Reverse Shoulder Arthroplasty; Outpatient Surgery; Ambulatory Surgery; Shoulder Arthroplasty; Functional Outcomes.

Introduction

Reverse shoulder arthroplasty (RSA) has become an established surgical treatment for a variety of shoulder pathologies, including cuff tear arthropathy, glenohumeral osteoarthritis with rotator cuff insufficiency, and massive irreparable rotator cuff tears[1]. Advances in implant design, surgical techniques, and perioperative care have contributed to substantial improvements in pain relief and functional outcomes following RSA[1].

Traditionally, shoulder arthroplasty procedures have been performed with postoperative inpatient observation due to concerns regarding perioperative complications, postoperative pain control, and early rehabilitation requirements. However, improvements in perioperative management and surgical pathways have facilitated the gradual transition of shoulder arthroplasty procedures to ambulatory surgical settings[2–4].

Several studies have demonstrated that outpatient shoulder arthroplasty can achieve complication and readmission rates comparable to those observed in inpatient settings when patients are appropriately selected[3–6]. Systematic reviews and meta-analyses evaluating outpatient shoulder arthroplasty have similarly reported low rates of short-term adverse events and high patient satisfaction, supporting the feasibility of same-day discharge in carefully selected populations[5–8].

More recent comparative analyses have also examined outcomes across different ambulatory care environments, showing that complication and readmission rates remain low in both freestanding ambulatory surgical centers and hospital-based outpatient facilities[9]. These findings suggest that ambulatory shoulder arthroplasty may represent a safe alternative to inpatient care when perioperative protocols and patient selection criteria are rigorously applied[6,9].

Nevertheless, the safe implementation of ambulatory shoulder arthroplasty depends on more than the surgical procedure itself. Published literature consistently emphasizes the importance of careful patient selection, including assessment of comorbidities, anesthetic risk, and the patient's ability to recover safely following same-day discharge[2,4]. In addition, modern outpatient shoulder arthroplasty pathways frequently incorporate regional anesthesia techniques and multimodal analgesia protocols to optimize postoperative pain control and reduce opioid consumption[10–12].

Although many studies have focused primarily on complication rates, readmissions, and cost comparisons between inpatient and outpatient care[2,6,13], fewer reports describe in detail the clinical pathways that support successful ambulatory reverse shoulder arthroplasty, particularly when they combine strict patient selection, multimodal opioid-sparing anesthesia, early supervised rehabilitation, and structured postoperative monitoring.

At our institution, ambulatory RSA is performed within a structured multidisciplinary clinical pathway designed to support safe same-day discharge and optimize early recovery. This pathway includes rigorous preoperative patient selection, standardized perioperative management, multimodal analgesia strategies, early supervised home-based physiotherapy, and proactive postoperative follow-up through nurse visits, telephone monitoring, and scheduled clinical evaluations.

The purpose of this study was to evaluate the early clinical outcomes of patients undergoing ambulatory reverse shoulder arthroplasty within this structured care pathway, with particular attention to postoperative complications, pain control, and functional recovery during the first 90 days after surgery.

Methods

STUDY DESIGN AND SETTING

This study was conducted as a prospective observational cohort evaluating early clinical outcomes of patients undergoing ambulatory RSA. Consecutive patients treated between February 2024 and December 2025 were included. All procedures were performed by two fellowship-trained shoulder surgeons at a private orthopedic center specializing in ambulatory musculoskeletal surgery. The objective of the study was to assess the safety and early functional outcomes of RSA performed with same-day discharge within a structured multidisciplinary clinical pathway designed to support ambulatory shoulder arthroplasty. All patients were followed for a minimum of 90 days after surgery.

PATIENT SELECTION

Patients were considered candidates for ambulatory reverse shoulder arthroplasty following

clinical evaluation by the treating orthopedic surgeon and multidisciplinary preoperative assessment. Selection criteria were designed to identify individuals with a low risk of perioperative complications and adequate social support for postoperative recovery outside the hospital setting. Eligible patients had a clear indication for reverse shoulder arthroplasty and were classified as American Society of Anesthesiologists (ASA) physical status I or II, or ASA III with stable and well-controlled comorbidities. In addition, patients were required to demonstrate the ability to ambulate independently or with minimal assistance, have a responsible caregiver available during the immediate postoperative period, and be willing to comply with postoperative follow-up and rehabilitation protocols. Patients were excluded if they presented uncontrolled systemic disease, severe cardiopulmonary comorbidities, active infection, severe cognitive impairment, or inadequate home support. Individuals with contraindications to ambulatory anesthesia or same-day discharge were also excluded from the ambulatory pathway.

PERIOPERATIVE CLINICAL PATHWAY

All procedures were performed using a standardized perioperative protocol designed to facilitate safe ambulatory management. Reverse shoulder arthroplasty was performed through a standard deltopectoral approach. Implant selection and surgical technique were determined by the operating surgeon based on patient anatomy and pathology. Anesthetic management followed a multimodal strategy aimed at optimizing postoperative pain control while minimizing opioid use. Regional anesthesia was used in all cases, consisting of either an interscalene block or a brachial plexus block. Postoperative analgesia was provided using either an elastomeric infusion pump or a transdermal buprenorphine patch according to individual patient needs. Patients were monitored in the post-anesthesia care unit for a minimum of four hours. Same-day discharge was permitted once patients met predefined clinical criteria including hemodynamic stability, adequate pain control, tolerance of oral intake, and availability of a responsible caregiver.

POSTOPERATIVE REHABILITATION AND FOLLOW-UP

Postoperative recovery was supported by an organized follow-up strategy designed to ensure early detection of potential complications and promote functional recovery. Rehabilitation began shortly after discharge and consisted of supervised home-based physiotherapy conducted by a professional therapist. Early mobilization and progressive restoration of shoulder function were emphasized according to established postoperative rehabilitation guidelines for reverse shoulder arthroplasty.

Postoperative monitoring included nurse visits at home, telephone follow-up during the first 48 hours after surgery, and scheduled in-office evaluations throughout the early recovery period.

OUTCOME MEASURES AND STATISTICAL ANALYSIS

The primary outcome of the study was the occurrence of postoperative complications within 90 days following surgery. Complications included infection, thromboembolic events, reoperation, hospital readmission, or any adverse event requiring additional medical intervention. Secondary outcomes included postoperative pain trajectories measured using the Visual Analog Scale (VAS), functional recovery assessed using the American Shoulder and Elbow Surgeons (ASES) score, and patient satisfaction with surgical care.

Continuous variables are presented as mean values with standard deviation, whereas categorical variables are reported as frequencies and percentages. Changes in functional outcomes between preoperative and postoperative evaluations were analyzed using appropriate statistical tests, with statistical significance defined as $p < 0.05$.

ETHICAL CONSIDERATIONS

This study was conducted in accordance with institutional ethical standards and the principles of the Declaration of Helsinki. All patients provided informed consent for surgical treatment and the use of their clinical data for research purposes. Patient confidentiality was maintained throughout the study. The authors declare no conflicts of interest, and no external funding was received for this study.

Results

PATIENT CHARACTERISTICS

A total of 34 consecutive patients underwent ambulatory reverse shoulder arthroplasty during

the study period. The mean age of the cohort was 70.9 years (range, 42–89 years). The study population was mainly composed of females (64.7%). The primary surgical indication was glenohumeral arthrosis (58.8%). The mean body mass index was 27.5 kg/m² (range, 22.1–32.8). Comorbidities were common but generally well controlled. All patients were classified as ASA physical status II following preoperative evaluation. Detailed baseline demographic characteristics and comorbidities are presented in Table 1.

Table 1. Patients baseline chatacteristics

Variable		Frequency	Mean ± SD
Age (years)			70.9 ± 11.2
Sex			
	Females	22 (64.7%)	
	Males	12 (35.3%)	
Comorbidities			
	DM	9 (26.5%)	
	Hypertension	24 (70.6%)	
	Coronary disease	4 (11.8%)	
Diagnosis			
	GH Arthrosis	20 (58.8%)	
	MRCT	13 (38.2%)	
	Chronic shoulder dislocation	1 (2.9%)	
BMI			27.5 ± 2.9
Obesity		6 (17.6%)	
Active smoker		3 (8.8%)	

DM: Diabetes Mellitus; GH: Glenohumeral; RC: Rotator Cuff; MRCT: Massive Rotator Cuff Tear; BMI: Body Mass Index.

PERIOPERATIVE MANAGEMENT

Regional anesthesia was used in all cases as part of the multimodal opioid-sparing analgesia protocol. An interscalene block was performed in 21 patients (61.8%), while a brachial plexus block was used in 13 patients (38.2%). The median surgical time was 180 minutes (range, 120 – 215).

Postoperative ambulatory pain control was achieved using an elastomeric infusion pump in 9 patients (26.5%) and a transdermal buprenorphine patch in 25 patients (73.5%). All procedures followed the institutional ambulatory arthroplasty protocol without deviation.

PAIN AND FUNCTIONAL OUTCOMES

Pain control during the early postoperative period was excellent. During the first postoperative week, most patients reported minimal or no pain, consistent with the multimodal opioid-sparing analgesia protocol used in this cohort. At the final 90-day evaluation, pain had decreased significantly compared with preoperative levels, with mean VAS scores improving from 8.8 ± 0.9 preoperatively to 1.7 ± 0.8 postoperatively (p = 0.004).

Functional recovery was also substantial. Mean ASES scores increased from 33.3 ± 4.8 preoperatively to 90.9 ± 2.8 at final follow-up, indicating marked improvement in shoulder pain and function (p = 0.019). These findings demonstrate not only statistical improvement, but also a clinically relevant recovery in early patient-reported outcomes after ambulatory reverse shoulder arthroplasty. Detailed comparisons of preoperative and postoperative outcome measures are presented in Table 2.

Table 2. Outcomes

Outcome	Preoperative	Postoperative	Mean change	*p*-value
VAS	8.8 ± 0.9	1.7 ± 0.8	-7.1	0.004
ASES score	33.3 ± 4.8	90.9 ± 2.8	+57.6	0.019

VAS: Visual Analog Scale; ASES: American Shoulder and Elbow Surgeons

COMPLICATIONS

No major postoperative complications were observed during the 90-day follow-up period. Specifically, there were no infections, thromboembolic events, hospital readmissions, reoperations, or conversions to inpatient care following same-day discharge. No adverse events requiring additional unplanned medical intervention were recorded.

Discussion

The most important finding of the present study is that ambulatory RSA performed in a medium complexity clinic and within a structured multidisciplinary clinical pathway resulted in excellent early functional outcomes, minimal postoperative pain, and no complications during the 90-day follow-up period in this carefully selected cohort. These findings are consistent with the growing body of literature demonstrating that shoulder arthroplasty can be safely performed in outpatient settings when appropriate patient selection and perioperative protocols are implemented[1,2,5–7,14].

Although ambulatory shoulder arthroplasty has been widely reported in high-resource settings in North America and Europe, its implementation in middle-income countries and medium-complexity institutions remains less frequently described in the literature. Most published outpatient shoulder arthroplasty programs originate from large tertiary academic centers or high-volume ambulatory surgical centers with extensive institutional infrastructure [2,5,8,14–16].

In contrast, the present study demonstrates that ambulatory reverse shoulder arthroplasty can be safely implemented in a medium-complexity private orthopedic center in a Latin American healthcare context, provided that the program is supported by rigorous patient selection, standardized perioperative protocols, and structured postoperative follow-up. In healthcare systems where hospital resources may be limited and inpatient capacity is constrained, well-organized ambulatory surgical pathways may represent an important strategy for improving efficiency while maintaining patient safety.

Recent studies have suggested that the expansion of outpatient arthroplasty pathways may improve healthcare resource utilization while maintaining comparable clinical outcomes[5,6]. These findings suggest that ambulatory RSA programs may be feasible beyond large tertiary institutions when supported by multidisciplinary coordination, standardized protocols, and close postoperative monitoring[16].

Over the past decade, multiple studies have evaluated the feasibility and safety of outpatient shoulder arthroplasty. Several systematic reviews and meta-analyses have reported low complication and readmission rates, suggesting that outpatient shoulder arthroplasty may achieve outcomes comparable to inpatient procedures when performed in carefully selected patients[5–8]. Ahmed et al.[7] conducted a systematic review and meta-analysis including multiple outpatient shoulder arthroplasty cohorts and found that complication and readmission rates were generally low and comparable to those observed in inpatient populations[7]. Similarly, Puzzitiello et al.[6] reported that outpatient total shoulder arthroplasty demonstrates acceptable safety profiles across multiple observational studies, although patient selection remains a critical determinant of outcomes[6].

Recent comparative studies have also examined outcomes across different ambulatory care environments. Mastrokostas et al.[9] analyzed outcomes of shoulder arthroplasty performed in freestanding ambulatory surgical centers compared with hospital-based outpatient surgical facilities and found similar complication and readmission rates between settings, reinforcing the notion that patient selection and perioperative management strategies are more influential determinants of safety than the physical location of surgery itself[9].

A central element of the present study is the rigorous patient selection process used to identify candidates suitable for ambulatory reverse shoulder arthroplasty. Careful selection of patients with controlled comorbidities, acceptable anesthetic risk, and reliable social support is widely recognized as a cornerstone of safe outpatient arthroplasty practice[2,15,17–19]. Previous studies have shown that ambulatory shoulder arthroplasty programs typically restrict eligibility to patients with stable medical conditions and adequate home support to reduce the risk of postoperative complications and unplanned hospital admission[2,6,17,20,21]. The patient cohort in the present study was characterized by

controlled comorbidities and ASA II classification in all cases, which likely contributed to the favorable outcomes observed.

Another important component of the clinical pathway implemented in this study is the use of multimodal opioid-sparing analgesia combined with regional anesthesia. Regional nerve blocks are widely used in shoulder arthroplasty and have been shown to significantly improve postoperative pain control while reducing opioid consumption and opioid-related adverse effects[11,12]. Multimodal perioperative analgesia strategies incorporating regional anesthesia, non-opioid medications, and targeted postoperative pain management have become increasingly central to enhanced recovery pathways in orthopedic surgery[10,12,22]. In the present cohort, regional anesthesia was used in all cases and postoperative analgesia was managed with either elastomeric infusion pumps or transdermal buprenorphine patches, resulting in excellent pain control throughout the postoperative period.

In addition to perioperative pain management, the postoperative recovery pathway may have played an important role in the favorable outcomes observed. Patients in this study began early supervised home-based rehabilitation, directed by a professional physiotherapist shortly after discharge. Early mobilization and structured rehabilitation protocols have been associated with improved functional recovery following shoulder arthroplasty and are considered essential components of modern perioperative care pathways[23]. Previous studies have demonstrated that early rehabilitation can facilitate restoration of shoulder function and improve patient-reported outcomes following reverse shoulder arthroplasty[23,24].

Another distinguishing feature of the pathway implemented in this study is the proactive postoperative monitoring strategy, which included nurse visits at home, telephone follow-up during the first 48 hours after surgery, and scheduled in-office evaluations. Early follow-up allows clinicians to identify potential complications promptly and reinforce adherence to postoperative rehabilitation protocols. Although the importance of early follow-up is frequently acknowledged in ambulatory arthroplasty studies, the specific monitoring strategies used during the early postoperative period are less consistently described in the literature[2,8]. The combination of home visits, telephone follow-up, and structured clinical evaluations used in the present study may therefore represent an important component of safe ambulatory arthroplasty care pathways.

The functional improvements observed in the present study are consistent with the well-established effectiveness of reverse shoulder arthroplasty for the treatment of complex shoulder pathology. Patients in this cohort experienced a marked improvement in shoulder function, with mean ASES scores increasing from 33.3 preoperatively to 90.9 at 90 days postoperatively. These results are comparable to functional outcomes reported in both inpatient and outpatient RSA cohorts described in the literature[1,5,14,23,25]. The substantial improvement in patient-reported outcomes observed in this study further supports the effectiveness of reverse shoulder arthroplasty when performed in appropriately selected patients within structured perioperative pathways.

The present study has several limitations. First, the sample size was relatively small and the study was conducted at a single specialized orthopedic center, which may limit the generalizability of the findings. Second, the observational design without a control group does not allow direct comparison with inpatient arthroplasty pathways. Third, the follow-up period was limited to 90 days and therefore does not provide information regarding long-term outcomes or implant survivorship. Despite these limitations, the study provides a detailed description of a structured clinical pathway for ambulatory reverse shoulder arthroplasty and demonstrates favorable early outcomes in a carefully selected cohort.

Conclusion

Ambulatory reverse shoulder arthroplasty performed within a structured multidisciplinary clinical pathway resulted in excellent early functional outcomes, effective pain control, and no complications in this carefully selected cohort. Careful patient selection, multimodal opioid-sparing anesthesia, early supervised rehabilitation, and proactive postoperative monitoring appear to be key elements supporting the safe implementation of ambulatory RSA.

Conflict of Interest Statement:

None.

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