Research Article

Evaluating Drug-Related Complications in Elective Total Hip and Knee Arthroplasty: A Retrospective Study

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A B S T R A C T

Introduction: Arthroplasty, often performed for degenerative diseases like osteoarthritis, significantly improves patient quality of life by alleviating pain and restoring mobility. This study focuses on drug-related complications in elective total joint arthroplasties, an area of concern as these complications can lead to adverse outcomes and prolonged hospital stays.

Methods: The study included 100 patients who suffered elective total hip or knee joint arthroplasty for six months. The demographic details, co-morbid conditions, type of arthroplasty procedure, and DRPs were collected from the patient's medical records. The data was analysed using descriptive statistics.

Results: The study found that 53% of the patients who suffered elective total joint arthroplasty were male. Diabetes mellitus was the most common co-morbid condition (48%), followed by hypertension (20%). Total hip replacement surgery was the most common procedure (71%), while total knee replacement surgery was performed in only 29% of the cases. The study found that 90.6% of DRPs were related to postoperative medications, while only 0.5% were related to home medications.

Conclusion: The study can help develop strategies to improve the quality of care provided to patients. It recommends the involvement of pharmacists within the preadmission and prehabilitation clinics to reduce the incidence of DRPs.

Keywords: Arthroplasty, Postoperative Medication, Prehabilitation, Drug-Related Complications

Introduction

Arthroplasty, commonly known as joint replacement or endoprosthesis surgery, is a surgical procedure that involves replacing a joint with synthetic materials that are securely fixed within the bone.[1] This procedure can involve either total replacement, where all joint surfaces are replaced, or partial replacement, where only one or some joint surfaces are replaced.[2,3] While hip and knee replacements are the most common types of arthroplasty, endoprosthesis implants can also be used to change joint functions in other areas, such as the elbow or shoulder.[4]

When degenerative diseases including fractures, osteoarthritis, and structural changes in bones and connective tissues cause the joint surface to deteriorate due to wear and tear of the cartilage lining, joint replacements are usually required. These disorders may result in limited mobility, loss of function, and chronic discomfort in the afflicted joint, all of which can significantly negatively impact the person's quality of life.[4-7]

Artificial joints have to be implanted when traditional therapies cannot relieve these symptoms to stop additional problems and allow the patient to resume everyday activities. Age largely influences the likelihood of joint replacement, with the average age of patients undergoing hip or knee replacement replacements ranging between 60 and 70 years.[8-10]

Methodology

Study Design: This study was designed as a retrospective cohort study, focusing on patients who underwent elective total hip or knee arthroplasty at VMKV Medical College and Hospitals, Tamil Nadu, between November 2018 and April 2019. The cohort consisted of patients who had undergone the surgical procedures and whose medical records were available for review.

Data Collection: Patient demographic information, medical history, co-morbid conditions, prescribed medications before surgery, and any identified drug-related complications (DRPs) were extracted from the patient's medical records. A random sample of 100 patients was selected for the study.

Statistical Tool Used for Analysis: Descriptive statistics were employed to analyze the collected data. Frequencies and percentages were calculated for categorical variables such as demographic details, co-morbidities, types of surgeries performed, and drug-related complications.

Ethical Approval: Ethical approval for this study was obtained from the Institutional Review Board of VMKV Medical College and Hospitals, ensuring that the study adhered to ethical guidelines for research involving human subjects.

Informed Consent: Informed consent was obtained from all participants or their legal guardians prior to inclusion in the study. Participants were informed about the purpose of the study, the nature of data collection, and their right to withdraw at any time without affecting their medical care.

Results

Prevalence and Drug-Related Problems with Chronic Health Conditions

Among the 100 patients selected for this study, 53% were women and 47% were men and their mean age was 65 years. Drug-related complications with long-term medical conditions of the participants in the study, 25% had long-term medical issues, with 48% of them having diabetes. 20% of the patients had hypertension, 8% had a history of COPD, 4% had coronary artery disease, 8% had lumbar spondylitis, 8% had hypothyroidism, and 4% had expectoration in their cough. Table 1 displays the outcomes.

Surgery

Out of the 100 surgeries performed, 68% were total hip replacements, while the remaining 32% were knee replacements. The results are presented in Table 1.

Categories of Drug-Related Complications

Only one out of 23 patients reported drug-related problems, accounting for 4.3% of the total. This problem involved an incorrect drug. Medication omissions were the most frequent problem, comprising 99% of all medication-related issues. Other problems included inappropriate dosage or strength, excessively frequent medication intake, and contraindications. There were also 15 concerns related to prospective pharmacological therapy indications, such as coronary artery disease, diabetes mellitus, hypertension, and chronic obstructive pulmonary disease.

Severity of Drug-Related Complications

A total of 174 drug-related complications were found in this investigation. These problems were classified using the framework developed by the National Coordinating Council for Medication Error Reporting and Prevention.[11] Out of the 174 complications, 55.7% were considered potentially harmful, 25.5% required monitoring, and 16.8% were not considered harmful. Only 0.5% of the 174 problems were not considered to be harmful and had been treated with over-the-counter drugs. Still, this issue entailed the patient receiving an improper medication—an ayurvedic therapy. Table 2 shows the results of the study.

35.2% of the 159 postoperative drug-related complications needed to be monitored and 64.7% of them were determined to be potentially dangerous. A prescription for tramadol without a limited dosage or frequency specified was one of these issues; if improperly supervised, this

prescription may have been dangerous. Another problem was that, for 97 out of 100 patients, the postoperative thromboprophylaxis order was not found. The study found 14 potential drug therapy indications; none of them needed to be monitored because they were not possibly hazardous. Tables 3 and 4 show the results of the study.

Table 1.Baseline Characteristics: Electively Uploaded for Total Joint Replacement

N = 100

Characteristics		%
Age (mean)	-	65
Sex	Male	47
	Female	53
Chronic medical conditions	Diabetes mellitus	12
	Hypertension	05
	Hypothyroidism + hypertension	02
	Coronary artery disease	01
	Chronic obstructive pulmonary disease	02
	Lumbar spondylitis	02
	Cough with expectoration	01
Surgery	Hip	68
	Knee	32

Table 2.Incidence of Drug-Related Complications (DRCs) By Category

Category of DRCs	Number of Patients having One or More Drug-Related Complications (DRCs)	Percentage of Drug-Related Complications (DRCs)
Self-medication	01	0.57
Post-operative	159	91.37
Potential indication	14	8.04

Table 3.Category-Based Examples of Drug-Related Complications

Category-Based Drug-Related Complications	Example
Therapeutic duplication	Prescriptions for both losartan and candesartan were altered.
Incorrect formulation	The prescription for nifedipine regular release was issued inadvertently instead of the intended XL (extended-release) formulation.
Inappropriate dose or strength	The prescription for metoprolol was adjusted from 50 mg dosage to 5 mg for home administration.
Inappropriate route	The prescription for brimonidine eye drops was originally intended for the left eye only, but it has been modified to be administered to both eyes.
Inappropriate frequency	Instead of twice daily, the prescription for metoprolol regular release is to be administered OD.
Omission of medication	The patients had been self-administering ramipril at home, although there was no hospital prescription for this drug.

Incorrect drug	The patient had been using formoterol at home but was Prescribed salmeterol during their hospital stay.
Contraindication	During the pre-admission clinic, prescriptions for spironolactone and ramipril-both related to elevated potassium levels—were obtained; however, no serum electrolyte order was placed upon hospital admission.
Other	An allergy assessment was required (the chart indicated an allergy to morphine, documented under the symptoms of "nausea and vomiting").
Postoperative medication	
Drug–allergy interaction	A prescription for morphine was ordered for a patient whose medical records indicated an allergy to codeine.
Therapeutic duplication	Prescriptions were issued for warfarin at both 5 mg and 7.5 mg daily dosages.
Inappropriate dose or strength	The intended dose of 0.5 to 1 mg of lorazepam was mistakenly prescribed as 5 to 10 mg.
Inappropriate frequency	Prescription for lorazepam to be taken "as needed", lacks specification regarding dosing frequency.
Omission of medication	There was an incomplete order for postoperative thromboprophylaxis and antibiotics.
Contraindication	Celecoxib was advised for a patient with a history of bleeding ulcers.
Potential indication for drug therapy	ß-blockers were not prescribed for the patient, even though a myocardial infarction was diagnosed. Angiotensin-converting enzyme inhibitor was not prescribed; the patient was diagnosed with diabetes mellitus. On a statin prescription, the patient was diagnosed with coronary artery disease.

Table 4.Categorisation of Drug-Related Complications by Type and Category

Category of Drug-Related Complications	Drug-Related Complications for Self-Medication (n = 1) n (%)	Drug-Related Complications for Postoperative Medications (n = 159) n (%)	Drug-Related Complications for Potential Indications (n = 14) n (%)
Interaction between medicine and allergies	0 (0.0)	0 (0.0)	0 (0.0)
Therapeutic replication	0 (0.0)	0 (0.0)	0 (0.0)
Non-formulary drugs	0 (0.0)	0 (0.0)	0 (0.0)
Wrong formulation	0 (0.0)	0 (0.0)	0 (0.0)
Incorrect strength or dosage	0 (0.0)	45 (25.8)	0 (0.0)
Incorrect method of administration	0 (0.0)	0 (0.0)	0 (0.0)

Unsuitable frequency	0 (0.0)	15 (8.6)	0 (0.0)
Lack of medication	0 (0.0)	97 (55.7)	0 (0.0)
Contraindication	0 (0.0)	2 (1.1)	0 (0.0)
Improper drug	1 (0.5)	0 (0.0)	0 (0.0)
Other	0 (0.0)	0 (0.0)	14 (8.0)

Discussion

A recent analysis of several patients in a South Indian health district who underwent elective total joint arthroplasty revealed that most of them had at least one drug-related problem. In particular, the majority of these problems were related to over-the-counter drugs, over 50% of which were thought to be harmful. Furthermore, individuals 65 years of age or older also had a higher chance of experiencing potentially dangerous drug-related complications, including problems with possible drug therapy indications. According to research by Haley et al., patients 65 years of age and above experienced an average of 2.03 drug-related difficulties per patient, while patients under 65 years of age experienced an average of 1.56 (p = 0.09). Additionally, 67 out of 100 elderly patients, or a larger percentage, had at least one drug-related problem using prescription drugs at home than did 46 out of 46 younger patients (p = 0.02).[11]

This study emphasises the importance of pharmacists screening patients for drug-related problems, specifically looking at prescriptions for home medications, people over the age of 65, the total number of home medications among patients with specific comorbidities, and those with multiple health conditions. Pharmacists can increase their influence on patient care by prioritising these areas.[12,13]

Kwan et al. identified the primary postoperative issue regarding home medications as omission (46.4%). The major concerns with postoperative orders were incorrect dosages and frequency. Similarly, medication omissions, illegible orders, improper dose frequencies, and drug-allergy interactions were among the most common drug-related issues identified by this study. Consequently, targeting prevention strategies specifically towards these types of medication errors could moderate drug-related problems and reduce potential patient significance.[12]

In this study, numerous drug-related problems were found among patients having total joint arthroplasty, despite the inherent limitations of a retrospective approach. Additionally, issues with managing the disease, such as possible drug therapy indications, were also taken into consideration as possible problems related to drugs. 174 problems were found overall, with 71% of patients experiencing at least one issue, even when these worries were taken out of the analysis. Drug-related problems could still be incorrectly classified, even though a second pharmacist approved the categorisation procedure. Furthermore, different classification techniques have produced varied results when applied to similar issues, and alternate tools for doing so are accessible.[14]

Pharmacists in the preoperative setting play a key role in ensuring patient safety and continuity of care by obtaining medication history, checking medication availability, arranging alternatives when required, documenting medication histories in hospital charts, prescribing discharge medication in advance, counselling patients on their medications, encouraging general health, and communicating with primary care physicians regarding any identified drug-related problems.[14–18]

Conclusion

Arthroplasty is a surgical procedure used to treat musculoskeletal joints, involving replacing, refining, or realigning the articular surface of the joint. This surgery is aimed at relieving pain and restoring joint function after injury or arthritis. Joint resection and interposition reconstruction are two types of arthroplasty surgeries used to treat joints such as the elbow, shoulder, ankle, and fingers. This surgery is usually limited to patients who are 60 years of age or elderly. According to a recent study, several drug-related problems were reported by patients who had general joint arthroplasty. This finding emphasises the necessity for pharmacists to identify, address, and prevent drug-related issues in this patient population in order to provide optimal patient care.

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