

# Surgical Prophylaxis: Is it Always Needed in Orthopaedics Practice

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## Abstract

**Introduction:** The objectives of this study were to assess the need for antibiotic prophylaxis in soft-tissue surgeries of short duration without usage of implant in the field of orthopedics.

**Materials and Methods:** A prospective and comparative randomized study was performed on 100 cases with clean elective surgical procedure of short duration <1/2 h. Data were analyzed for development of surgical site infection (SSI) in clean elective soft-tissue procedures of short duration.

**Results:** In our carefully selected cohort of patients of clean soft-tissue surgeries of less than half hour duration without involving the use of implant, two groups were made based on block randomization technique, one of which got a shot of pre-operative antibiotic prophylaxis and other did not. Mean patient age was 36.1 years (04 month-66 years). In both groups at all age levels, no infection was found. In the group which received antibiotic 80.8% were female and 19.2% were male, and in the antibiotic not given group had 61.5% female and 38.5% male. Therefore, it is evident that antibiotics did not provide clinical or statistical protection against SSI in clean elective soft-tissue procedures of short duration.

**Conclusion:** We suggest stratification of use of antibiotic prophylaxis, that is, antibiotic prophylaxis is required for surgeries of longer duration involving placement of implants but not required in surgeries of short duration which do not involve placement of implants in the field of orthopedics.

**Keywords:** Surgical Prophylaxis, Surgical site infection, Orthopaedics Practice

## Introduction

Surgical site infection (SSI) is one of the common complications with any surgical procedure, leading to prolonged morbidity, disability, and cost. SSI is defined as any infection at the surgical site within 30 days of the procedure if no implant is left in place, or within 1 year if an implant is left in place, according to the Centers for Disease Control and Prevention [1, 2]. The prevalence of SSI is 1–2% in clean surgeries in advanced centers of developed countries; however, the prevalence is 2–4% in developing countries [3]. Antibiotic prophylaxis, meticulous surgical techniques, good aseptic measures, proper OT conditions, and good sterilization practices are some of the measures undertaken to reduce the

incidence of SSI's.

Antibiotic prophylaxis before induction of anesthesia is an important strategy of preventing post-operative infection [4]. The purpose of antimicrobial prophylaxis is to achieve drug levels in the blood and tissues that are higher than the MIC for the organisms that are likely to be encountered during the procedure [5].

However, one must consider the drawbacks of excessive antibacterial use. Antibiotics are most efficient at preventing infection whenever aimed against specific pathogens; but, when used against several species, antibiotics become less effective and may even be detrimental, as they encourage the development of multi-drug resistance. Therefore, a delicate balance between the use of antimicrobial agents to prevent infection and the overuse of antimicrobial agents, which are associated with the development of drug toxicity and super infection, increase in health-care cost and colonization of wards by highly resistant strains and it should not be the norm for all surgeries [6].

Many reports have established the fact that there is no increase

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in SSI rate if prophylactic antibiotics are not given for short duration in clean elective soft-tissue surgeries [7, 8].

As of now in the field of orthopedics, there is unanimity of opinion regarding use of prophylactic antibiotic where implants are left in place; however, there is no consensus over use of prophylactic antibiotic for clean soft-tissue surgeries of short duration (<1/2 h).

Therefore, the aim of this study is to establish the fact that whether there is need of antibiotic prophylaxis in clean elective soft-tissue surgeries of short duration (<1/2 h).

### Materials and Methods

Study design and participants-this is prospective comparative randomized study performed in department of Orthopedics, ESI Hospital Basaidarapur, New Delhi, India. Any clean elective surgical procedure of short duration <1/2 h, namely, Trigger finger-A1 pulley release, De Quervain's tenosynovitis -1st Dorsal compartment release, Carpel tunnel syndrome-Flexor retinaculum release, Benign mass lesions of hand-Excision biopsy, Ganglion-Excision, Lipoma-Excision, CTEV-Percutaneous tenotomy, and Dupuytren's contracture-Subtotal fasciectomy were included in this study. Patients having established diabetes mellitus, patients on steroids, any past history of surgery on same region, patients of rheumatoid arthritis, and concurrent or recent treatment with antibiotic were excluded from the study.

Patients coming under inclusion criteria were enrolled for study after taking prior consent in orthopedics department by the investigator. After all routine preanesthetic blood investigations were done. The patient was randomized into two blocks A and B using a sealed envelope technique. Group A patients received antibiotics and Group B represents patients did not get antibiotics. All the patients of Group A were given a single dose of inj. Ceftriaxone, as per body weight intravenously half an hour before skin incision after sensitivity testing. All patients were operated by same surgeon. Closure of the wound was done by 3/0 mono filament nylon sutures in all cases of Group A and Group B. Follow-up was done till 1 month, namely, day 3, 7, 14, and 30 for any sign of infection.

Descriptive statistics analyzed with SPSS version 17.0 software. Continuous variables were presented as mean  $\pm$  SD. Categorical variables expressed as frequencies and percentages. The Pearson's Chi-square test or the Chi-

square test of association was thought to be used to determine if there is a relationship between two variables ( $p < 0.05$  considered statistically significant).

### Results

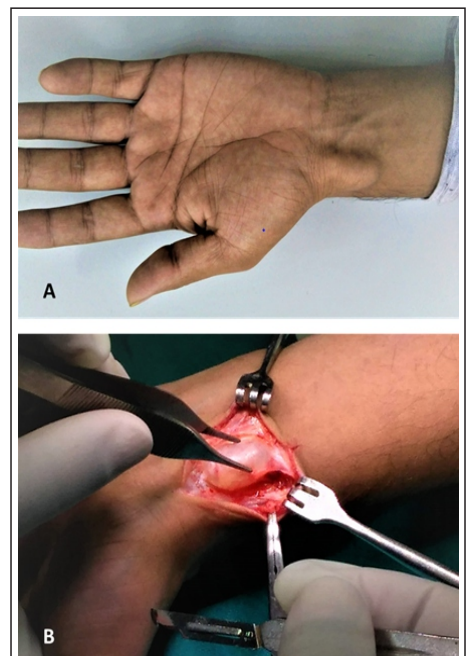
The present study was conducted to compare the effect of antibiotic prophylaxis in clean elective soft-tissue surgeries of short duration. Antibiotic prophylaxis was administered in 50 patients, and 50 patients did not receive prophylaxis. The mean patient age was 37.1 years (range, 0.3–66 years Table 1). In the group which received antibiotic 80.8% were female and 19.2% were male, and antibiotic not given group had 61.5% female and 38.5% male (Table 1). In both groups, and in both gender, no infection was found, thereby suggesting that gender had no role to play in development of infection in elective clean soft-tissue surgeries of short duration. The group of the 50 patients who did not receive pre-operative antibiotics, none (0.0%) acquired a post-operative infection, and the same was the case with other group of 50 patients who received pre-operative antibiotics (Table 2). These findings are in agreement with other studies [7-15] that have documented the lack of need of prophylactic antibiotic use in clean elective surgery of short duration. (Fig. 1, 2)

### Discussion

Before the introduction of antibiotics, patients underwent surgery frequently experienced "irritative fever" which was followed by purulent discharge from their incisions,



**Figure 1:** Images of a case of dupuytren's contracture involving little finger showing (a) pre-operative contracture flexing little finger, (b) Zig Zag incision over ulnar aspect palmer region extending up to PIP joint line of little finger. Post-operative follow-up of patient showing healing with no sign of infection (c) on day 7 and (d) on day 30.



**Figure 2:** A case of swelling over radial aspect of wrist. (a) Pre-operative image. (b) Intraoperative dissection showing ganglion cyst.

Table 1: Gender distribution				
Gender	Pre-operative antibiotic status			
	Given		Not given	
	Count	Column n%	Count	Column n%
Female	41	80.8	31	61.5
Male	9	19.2	19	38.5
Total	50	100	50	100

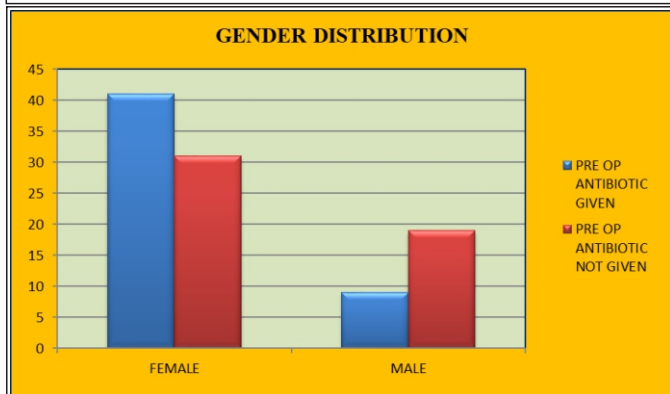


Table 2: Post-operative infection		
Fever, discharge, redness, pus or fluid coming out of wound, tenderness, and warm local skin		
	Antibiotic given group	Antibiotic not given group
Day 3	Nil	Nil
Day 7	Nil	Nil
Day 14	Nil	Nil
Day 30	Nil	Nil

overwhelming sepsis, and, in some cases, even death [2]. Infection is one of the most dangerous and feared consequence in orthopedic surgery. After the accidental discovery of antibiotic, they were used extensively in post-operative period to reduce post-operative mortality and morbidity due to infective complication; however, emergence of antibiotic resistance raised questions over their indiscriminate use. In 1961, Burke [6] came with the path-breaking concept of pre-operative antibiotic prophylaxis which resulted in decrease in incidence of post-operative infection. It was a watershed moment in the fight against SSIs. However, it was soon realized that infections occurred mostly in surgeries where duration was more or implants were placed and very rarely in elective clean soft-tissue surgeries of short duration. This led many authors to question whether pre-operative antibiotic prophylaxis actually is needed to reduce post-operative infection in such cases, especially in the context of emergence of drug resistance.

In our carefully selected cohort of patient of clean soft-tissue surgeries of less than half hour duration without involving the use of implant, two groups were made, one which got a shot of pre-operative antibiotic prophylaxis and other did not. In our study, group of the 50 patients who did not received pre-operative antibiotics, none (0.0%) acquired a post-operative infection, and the same was the case with other group of 50 patients who received a pre-operative antibiotic. These findings are in agreement with other studies [9-15] that have documented that the prophylactic antibiotic usage in surgery of short duration without usage of implant is not warranted.

Table 3: Cases operated					
Case	Procedure	Pre-operative antibiotic status			
		Given		Not given	
		Count	Column n%	Count	Column n%
Ganglion cyst	Cyst removal	10	20	10	20
Trigger finger	A1 pulley release	15	30	10	20
DQT	1 <sup>st</sup> dorsal compartment release	4	8	6	12
Dupuytren's contracture	Subtotal fasciectomy	5	10	4	8
Mass lesion	Excision biopsy	5	10	6	12
Carpal tunnel syndrome	Carpal tunnel release	10	20	10	20
Boutonniere deformity	Deformity correction	0	0	1	2
CTEV	Tenotomy	1	2	3	6
Total		50	100	50	100

### Conclusion

Antibiotics did not provide clinical or statistical protection against SSI in clean elective soft-tissue procedures of short duration, according to the present study. To create more clear guidelines, however, a study with a large sample size or a meta-analysis is recommended.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

**Conflict of Interest:** NIL; **Source of Support:** NIL

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