


# Screening complications in the postoperative period of orthopedic surgeries by video arthroscopy

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**ABSTRACT.** To analyze the prevalence and characteristics of late postoperative complications of orthopedic surgeries by video arthroscopy. This was a descriptive cross-sectional study that evaluated, through its own instrument, local and systemic postoperative complications of patients undergoing orthopedic surgeries by video arthroscopy. The study included 270 patients, who were evaluated on days 30 (without prosthesis) and 90 (with prosthesis placement) of the postoperative period, by telephone service. The selection of participants occurred sequentially and population-based, within the data collection period, from February to July 2020, in a large hospital for medium and high complexity surgeries. Of the 270 procedures performed in the period, 4.4% (n = 12) presented late postoperative infection. The most frequent complications were erythema (83%), edema (75%) and secretion (67%) in the surgical wound. Most used antibiotic therapy (92%) and anti-inflammatory drugs (67%). Hospital readmission was not necessary concerning the complications. Only 50% required medical evaluation before the scheduled time. The need for practices that ensure the quality of perioperative care and improve the active search to assess surgical outcomes is reinforced.

**Keywords:** nursing; cross infection; bacterial infections; infection control.

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## Introduction

National data from the Ministry of Health Management Report 2017 highlight that approximately 1,827,811 elective surgeries were performed throughout Brazil, by various methods and professionals in the medical area (Relatório Anual de Gestão (RAG) 2017, 2018).

These procedures advocate some pragmatic steps that ensure the success of the surgical process. However, although all pre-, intra- and post-operative care is adopted, some complications may occur such as edema, dehiscence, thrombosis, neurological complications and infectious conditions, which may be related to the operating site, or even evolve to severe septicemia. These complications may, when aggravated, be related to the need for longer hospitalization, intensive care and health resources such as endotracheal intubation, venous and arterial punctures, bladder catheterization and other invasive techniques (Sáez & Montes De Oca, 2020).

In the postoperative period, there are several risks of complications of a surgical procedure, with operating site infections as the most prevalent. Several factors are associated with it: obesity, advanced age, potential for surgery contamination, underlying diseases, such as diabetes mellitus, distance from the infection site and especially the surgeon's surgical technique (Costa, Mendoza, Mazzucca, Akamine, & Riera, 2016).

Surgery can be classified according to its potential for contamination as: clean (elective without invasion of mucous membranes or other colonized tract), potentially contaminated (reaching mucous membranes, female digestive tract, genital or cervix), contaminated (involvement of highly contaminated tissues) and infected (tissues with infection). The risk of infection increases according to the potential for contamination (Tostes, Maran, Raimundo, & Mai, 2016). Infections in general, especially orthopedic infections, increase the length of stay in the hospital, as well as increase morbidity, and increase hospital costs by up to three times. Related factors such as advanced age, infections elsewhere, systemic steroid use, associated with smoking and alcoholism, immunosuppressed people are additional factors that contribute to the risks (Tostes et al., 2016).

In patients with orthopedic surgeries, studies indicate that factors associated with postoperative complications are closely associated with open injury, surgical duration > 132 minutes, and hematological changes, such as low albumin levels and hyperglycemia.

Regarding orthopedic procedures that are more related to late complications and the need for unplanned admissions, those related to general anesthesia, time-consuming surgeries and procedures such as arthroscopy, hallux corrections or removal of osteosynthesis material are more frequent (Salas et al., 2020). The use of screws, plates and fixation devices are examples of instruments that, due to their long permanence and risk of colonization, are associated with a higher risk of infection (Vieira et al., 2015).

The therapeutic approach is also related to the rate of complications and late infections, it is worth noting that minimally invasive surgeries (by video arthroscopy) have a lower incidence of infection when compared to open surgeries (Zhou et al., 2020).

Although there is no consensus, the infection rates are estimated between 2.7 and 43.5% in the postoperative period in the first 30 days (Jinbo et al., 2020). A study on postoperative complications, surgical wound infections accounted for 30.8%. Another study shows that the incidence of postoperative infections was 18.5%, with a hospital readmission rate of 20%. Studies on 985 orthopedic surgeries show an index of 5.3% infections in patients who used external fixators, whose infection rate was 36%. The search for medical care due to these complications occurred on average 21 days after the procedure (Sousa, Bim, Hermann, Fronteira, & Andrade, 2020). As a means of preventing possible infections caused during surgery, surgical antibiotic prophylaxis, abbreviated fasting and the prevention of hypothermia may be used.

The most common complications in the traumatological postoperative period refer to infections, especially surgical site infections, respiratory complications, urinary infection, and other complications, such as bleeding and dehiscence. The most common signs are pain and fever, added to local pain, heat, erythema and, in some cases, dehiscence (Vieira et al., 2015).

Early postoperative infections can occur in the first 30 days, since the first 48 hours are critical due to metabolism and surgical trauma itself, complications usually linked to increased temperature in the first hours after surgery. Beyond the infection of the surgical wound, infections associated with venous catheters and bladder probes may also occur (Sousa et al., 2020).

As a means to prevent possible infections caused during surgery, surgical antibiotic prophylaxis, abbreviated fasting and prevention of hypothermia may be used. The antibiotic prophylaxis protocol can be defined as the administration of antibiotics prior to the manipulation of anatomical regions where no infection is installed. It is used to prevent the establishment of infection due to the presence of normal flora or possible microorganisms present with reduced risk of infection in the surgical site. However, the therapeutic use of antibiotics refers to their application in situations of established localized infections. Thus, there should be a good level of serum and tissue at the time of incision that lasts until the end of the surgery. On the other hand, the very early institution of antibiotics with prophylactic purpose will lead to the selection of microbial flora of the patient contributing to the ineffectiveness of the antimicrobial regimen. Antimicrobial prophylaxis is not frequently used in clean surgeries where the risk of infection is low (Mello et al., 2019).

The abbreviation of fasting can prevent postoperative consequences such as thirst, dehydration, irritability, anxiety, nausea, weakness and hunger, insulin resistance, and on the other hand, improve the cellular response, improving the healing process, reducing surgical site infections (De-Aguilar-Nascimento et al., 2017).

Furthermore, helping to reduce surgical infections, the control of body temperature is essential, since hypothermia in the postoperative period triples the incidence of infections from the surgical site. It is worth stating that the more severe the hypothermia, the higher the risk of infection of the surgical site and the more severe the infectious condition. For this reason, international guides recommend the maintenance of normothermia as a goal among preventive measures (Yamada et al., 2020).

Therefore, the research question was: what is the rate of infections in the postoperative period of patients undergoing video orthopedic surgeries? Thus, the general objective was to identify, within the context of surgical care, the rates of infections of patients undergoing video-assisted surgeries.

## Material and methods

This was a descriptive, cross-sectional study conducted in a center of high medical complexity. All postoperative patients of surgeries classified as orthotraumatological, through video surgeries, participated in the study, within the data collection period. Data were collected from February to July 2020 in a large hospital for medium and high complexity located in northern Rio Grande do Sul (Polit & Beck, 2011).

Participant selection criterion was undergoing video orthopedic surgery within the data collection period and in the study scenario. Patients were selected in the health service, through a daily visit of the researchers to the data collection field. Patient medical records were accessed and after meeting selection criteria, participants were invited to participate voluntarily in the study.

The sample design considering a population of patients undergoing video surgery in the aforementioned period established a confidence level of 95% and, therefore, a margin of error of up to 5%.

After accepting to participate in the study, the patient and/or relative/guardian received information on the follow-up process (infection screening), its importance in the safety and qualification of care before the surgeries, highlighting each step of the data collection. As it is a longitudinal study with cross-sectional design data were collected via telephone, since the signs and symptoms/complications were assessed on day 30 postoperatively and on day 90 postoperatively for those with prosthetic implant (Brasil, 2017). Studies indicate that the use of telephone interviews as a diagnostic tool for post-discharge surveillance and follow-up of patients showed good results in terms of reliability and validity (72% sensitivity and 100% specificity). Data were collected via telephone calls with the patient or family member (Platt, Iokoe, & Sands, 2001).

For data collection, an instrument was divided into three parts: the first referred to identification data, such as: age, sex, type of surgery and date of the procedure. The second part of the instrument, exclusively dichotomous (yes or no) referred to the signs and symptoms/complications: 1) hyperthermia (over 38°C); 2) increased temperature at the incision site; 3) presence of secretion at the incision site; 4) respiratory problems after surgery; 5) suture dehiscence; 6) edema at the surgical site; 7) hyperemia (redness) at the surgical incision site. The third part, also dichotomized (yes or no), referred to the procedures: 1) need to contact the surgeon in unforeseen situations; 2) need for anti-inflammatories; 3) need for antibiotics; 4) readmission; 5) reported to the Nosocomial Infection Control Service (NICS) of the institution through the available channel; 6) need for medical attention before the reassessment visit.

Data were analyzed with descriptive statistics (absolute and relative frequency). There was also a comparison of frequencies between complications and the need to use anti-inflammatory drugs and antibiotics, with the use of the Fisher's test, using a significance value of  $p < 0.05$ . The research was submitted to the Research Ethics Committee, approved as stated in the opinion 3.800.155.

## Results and discussion

In the period analyzed from February to July 2020, 270 video-assisted trauma surgeries were performed. Of this total, about 4.4% ( $n = 12$ ) presented late postoperative infection. The number of procedures and the prevalence of infections, distributed in the months evaluated, is illustrated in Figure 1.

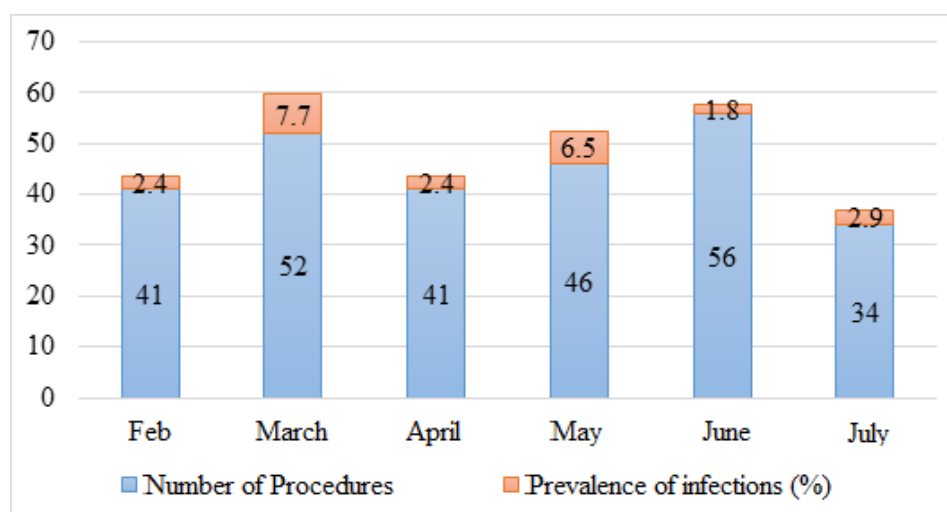
It is worth mentioning that March had the highest prevalence, with almost 7.7% followed by May. June showed the highest number of procedures in the period analyzed. Table 1 lists the most frequent signs and symptoms and the procedures.

The most frequent signs and symptoms were erythema and local edema, with 83 and 75%, respectively. The procedures taken by the patients and/or the physician indication, concerning the complications, were the use of antibiotics and anti-inflammatory drugs, with 92 and 67%, respectively. The factors associated (most frequent signs and symptoms) with the use of anti-inflammatory drugs and antibiotics is described in Table 2.

Importantly, the use of AI was significantly more frequent in patients with local edema, and the other complications did not present significant difference for the use of ATB and AI.

The event of postoperative complications is multiple, and infections are one of the main consequences and affect the recovery time of the surgical patient. Although it is not consensual, postoperative infection rates range from 5.8 to 43.5% in the first 30 days. Among postoperative complications, surgical wound infectious complications stand out with rates of 2.8 to 30.8%, followed by pneumonia, from 3.0 to 22.5%. These indices depend on the type of procedure and the clinical condition of each patient, considering the variables intrinsic to the patient, such as age, malnutrition, concomitant diseases and immunosuppression

(Mello et al., 2019). Postoperative infections are known to extend the length of stay, morbidity rate, hospitalization rates and financial costs. The presence of intrinsic factors with advanced age, concomitant infections, steroid use, smoking and alcoholism, increase the risk of infection.



**Figure 1.** Prevalence of postoperative infection in patients undergoing video-assisted trauma surgeries. Passo Fundo, 2020.

**Table 1.** Signs and symptoms and management of patients with postoperative infection in orthopedic video surgeries, 2020 (N = 12).

Signs and Symptoms	n	%
Hyperthermia (> 38°C)	1	8
Erythema (OW)	10	83
Secretion (OW)	8	67
Suture Dehiscence (OW)	5	42
Edema at the Site	9	75
Hyperemia (OW)	7	58
Procedures		
Contacted Surgeon	9	75
Contacted another physician	4	33
Use of Anti-inflammatory	8	67
Use of Antibiotics	11	92
Hospital readmission	0	
Needed medical reevaluation ahead of schedule	6	50
NICS communicated, as directed	0	0

Abbreviations: OW: Operative Wound; NICS: Nosocomial Infection Control Service.

**Table 2.** Signs and symptoms associated with the use of anti-inflammatory drugs and antibiotics in patients with postoperative infection from orthopedic trauma video surgeries. Passo Fundo, 2020 (N = 13)

Signs and Symptoms	AI Use n(%)	p-value* (P)	ATB Use n(%)	p-value* (P)
Hyperthermia (> 38°C)	1(12)	0.667	1(9)	0.917
Erythema (OW)	7(87)	0.576	10(91)	0.167
Secretion (OW)	5(62)	0.594	8(73)	0.333
Suture Dehiscence (OW)	5(62)	0.071	5(45)	0.583
Edema at the Site	8(89)	0.018	9(82)	0.250
Hyperemia (OW)	6(75)	0.152	7(64)	0.417

Abbreviations: AI: Anti-inflammatory; ATB: Antibiotic; OW: Operative Wound; \*Fisher's exact test;

Regarding the above, studies show that, among the events in the postoperative period of general surgeries, infectious complications were the most common, with higher incidence in the surgical wound, pneumonia and other complications of the respiratory tract, bleeding and dehiscence (Mello et al., 2019). In another study, with patients in the postoperative period of orthopedic surgeries, analyzing 38 cases of some type of event, the most pronounced complications were infections, especially osteosynthesis with external fixator in 36 patients (94.7%) and 17 (34%) who used fixing plate. Emphasizing that the use of screws, plates and external fixation can increase the rates of infections. In these cases, the most common signs are pain and fever, in addition to edema, heat, erythema, dehiscence and pus (Vieira et al., 2015).

A study on 985 cases of orthopedic surgeries showed a rate of infections of 3.8%, and the average period between the surgical procedure and the evidence of infections was 21 days. Similarly, osteosynthesis was the main cause of infection; 23.7% patients who had infections had some type of morbidity, such as hypertension and diabetes, including progressing to osteomyelitis. The prevalence of microorganisms causing infection in order of importance were *Staphylococcus epidermidis*; *Acinetobacter baumannii*; *Staphylococcus aureus* (Vieira et al., 2015).

A study with patients submitted to mandibular fixation, with the use of prophylactic and therapeutic antibiotics, showed the use of these drugs in the postoperative period, not significantly reducing the rates of infections when compared to the prophylactic use (De-Aguilar-Nascimento et al., 2017). This emphasizes the importance of the correct use of antibiotics for controlling infections in the postoperative period, especially to avoid resistance to bactericidal agents (Vieira et al., 2015).

The common sources of infection refer to microorganisms of the endogenous flora of the patient, thus being extremely important to use a precise aseptic technique, which aims to prevent infections. Contamination of the surgical site may occur in the perioperative period, and risk factors may be related to the own patient (intrinsic risks), to the hospital environment, including in the postoperative period (extrinsic risks), in addition to the time, type and site of surgery, length of hospital stay. Therefore, the knowledge and actions developed in the control/minimization of these risks are determinant for infection control (Moura, Trivellato, Figueiredo, Gabrielli, & Pereira-Filho, 2017).

An important extrinsic factor is the process of sterilization of instruments. In a study conducted at the university hospital of USP, the difficulties in cleaning single-use instruments were evaluated. Among other data, over half of the instruments searched are not dismountable and are not transparent, which may compromise the cleaning process. In 38.5% of these, there were difficulties in manual cleaning. The authors suggest careful evaluation for decision-making regarding reuse, as well as other means for washing these materials, such as the use of ultrasonic washers. Most of these instruments are materials used in video surgery (Martins et al., 2018).

One of the main indicators of the quality of care in the perioperative period is the rate of Surgical Site Infection (SSI) for clean surgeries. This indicator includes actions such as surgical technique, environment and sterilization of instruments and material. Concerning preoperative care, the recommendations are: preoperative hospitalization time below 24 hours; the trichotomy time should be less than two hours, and the use of scissors or electric trichotomy device, the use of blades or knives are not recommended. The use of prophylactic antibiotics should begin one hour before the procedure and should be administered not later than 24 hours. Degermation and antisepsis should be done according to the recommended technique and solutions; preoperative blood glucose control is essential to prevent SSI, given that hyperglycemia increases the risk of infections; as well as body temperature control (Graziano et al., 2006).

In surgeries classified as clean that are performed in sterile tissues or those passive of decontamination, no local infectious and inflammatory process, or even, no gross failures, the SSI indices are 1 - 5%, and the monitoring of these indicators is paramount in the definition of infection indices. Therefore, minimizing the risks of infections and other postoperative complications should be addressed as a priority in health services. The challenge is to improve patient safety, and the implementation of a checklist, and concerning infection, two items are priorities: the administration of surgical antibiotic prophylaxis and sterilization of materials, instruments and equipment in safe conditions of use (Gebrim, Dos Santos, Barreto, Barbosa, & Do Prado, 2016).

To minimize the risks of infection and perioperative complications, the World Health Organization (WHO) proposes some measures to be followed preoperatively: that patients bathe with simple soap or antimicrobial soap or solution; prophylactic antibiotics should be administered prior to surgical incision; patients undergoing cardiac or orthopedic surgery with nasal fossa colonized with aureus should be treated with antibacterial ointment or chlorhexidine solution; the use of oral antibiotics is indicated in the preparation of patients who will undergo rectal surgery; the use of blade razor for trichotomy of patients is not indicated; the antiseptics referred to are alcohol-based and chlorhexidine gluconate; dressing with antimicrobial solution should not be used in the surgical incision (Prates, Stadnik, Bagatini, Caregnato, & Moura, 2018).

Intraoperative measures include: suspension of immunosuppressant before surgeries in surgical sites with infection; the patient should remain warm; use a blood glucose control protocol in diabetic patients and non-diabetic adults; use of plastics or other antimicrobial-owned tissues is not recommended; there is no evidence on the use of saline solution before closure or saline solution with antibiotics; there is no evidence that the use of double gloves can reduce infection rates (Prates et al., 2018).

The measures indicated in the postoperative period refer to: no prolonged use of antibiotic prophylaxis, aiming to decrease infection rates; protection of the surgical wound can be obtained with a simple dressing; not extending the use of prophylactic antibiotics due to the use of drains in the postoperative period. The risk factors are many, and some cannot be modified such as age and sex; however, some factors can be adjusted and decrease the rates of infections, such as: adequate nutritional conditions, correct use of antibiotics and an adequate intraoperative technique (World Health Organization [WHO], 2016).

Video surgeries have lower risks of infection in relation to open surgeries. However, a serious problem is the post-discharge follow-up, and the notification of cases of infections, which is very important, because it provides information that will allow to evaluate the quality of patient care, the quality and accreditation of hospital services (Vilas-Boas, Mingotte, & Freitas, 2015).

## Conclusion

The prevalence of late postoperative complications in video-assisted orthopedic surgery in the scenario of the present study was 4.2%. There was a period that the evaluation indicated a maximum prevalence of 7.2%. The most common signs and symptoms were erythema and local edema, and the most frequent procedures were the use of anti-inflammatory and antibiotics. It is noteworthy that local edema was the most significant and frequent complication of the use of AI.

Despite all this technological gain, some problems persist, which include infections. The minimization of peri- and post-operative risks focus on adopting measures that minimize the risks. Therefore, the adoption of safe surgery practices contributes effectively, so that complications can be minimized as much as possible.

Epidemiological surveillance in the postoperative period is indispensable to ensure quality of care, review and readjust techniques and procedures, as well as standardize the procedures. This brief study shows that postoperative complications, especially infections, represent a serious element to be considered in restructuring and reorganizing services.

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