Infectio® Surgery

A Quarterly Magazine

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Current News

Kaiser Permanente Study Finds No Increased Risk in Providing Flu Vaccine to Surgical Patients

PASADENA, Calif., March 14, 2016 /PRNewswire/ -- Surgical patients who received the flu vaccine during their hospital stay did not have an increased risk of emergency department visits or subsequent hospitalizations in the week following discharge, compared with surgical patients who did not receive the vaccine. The new study from Kaiser Permanente, published in the Annals of Internal Medicine, also found that compared with unvaccinated surgical patients, vaccinated surgical patients did not have an increased risk of fever nor did they have an increased number of laboratory tests checking for infection.

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SURGICAL SITE INFECTIONS

Summarized by:
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INTRODUCTION:

Surgical site infections (SSI) have played a major role in the evolution of medical care throughout history. Wound complications contributed significantly to the historical surgical mortality rates before the development of Lister's aseptic approach in the nineteenth century. The impact of the antiseptic/aseptic techniques was readily apparent in its adaptation to battlefield medicine. During the civil war in America, surgeons operated bare handed, with wound suppuration considered to be beneficial aspect of wound healing. With the gradual acceptance of the principles of antisepsis, and the usage of sterile dressings and aseptic surgical techniques, there was a dramatic reduction in mortality from wounds to 7.4% in the Spanish American war.

Despite nearly 2 centuries of medical progress, the management of surgical infections remains a pressing concern, and SSIs continue to be a leading component of nosocomial morbidity and mortality. In this article, the epidemiology, pathogenesis, risk factors and approach to prevention of SSI are reviewed.

DEFINITION:

CENTRE FOR DISEASE CONTROL AND PREVENTION NATIONAL HEALTHCARE SAFETY NETWORK DEFINITIONS FOR SURGICAL SITE INFECTIONS:

SUPERFICIAL INCISIONAL SURGICAL SITE INFECTION:

Infections occur in 30 days after the operation procedure and involves only skin and subcutaneous tissue of the incision and patient has at least one of the following:

1. Purulent drainage from the superficial incision.
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
3. At least one of the following signs and symptoms of infection: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon and the culture is positive or not cultured. A culture negative finding does not meet this criterion.
4. Diagnosis of superficial incisional SSI by the surgeon or attending physician.

DEEP INCISIONAL SURGICAL SITE INFECTION:

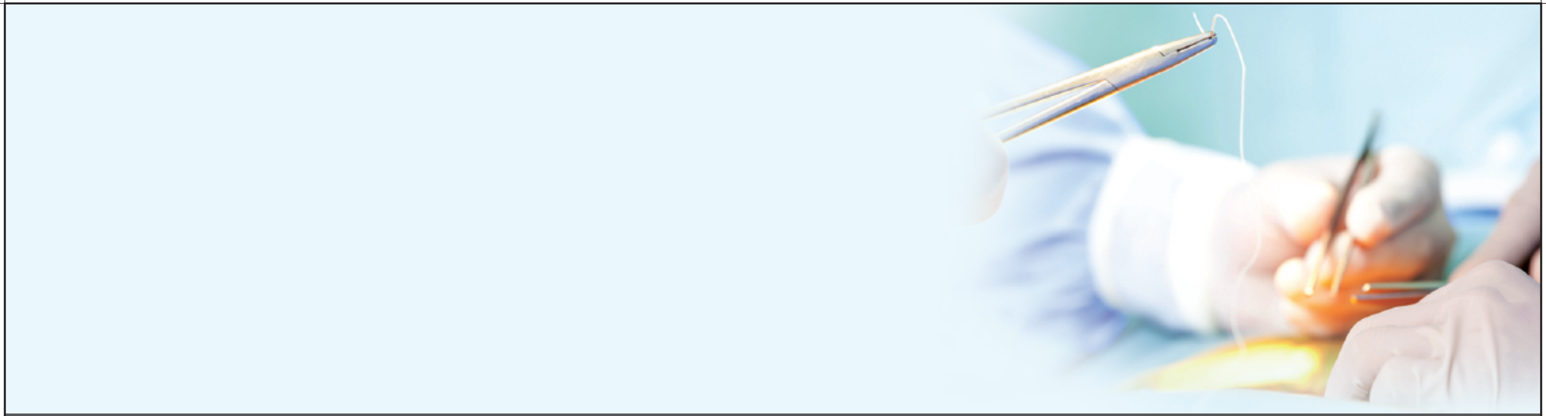
Infection occurs within 30 days after the operative procedure if no implant is left in place or one year if implant is in place and the infection appears to be related to the operative procedure and involves deep soft tissue (e.g., fascial and muscle layer) of the incision and patient at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture positive or not cultured when the patient has at least one of the following signs or symptoms: fever (>38.C) or localized pain and tenderness. A culture negative finding does not meet this criterion.
3. An abscess of other evidence of infection involving the deep incision is found on direct examination, during the reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of a deep incision from a surgeon or an attending physician.

ORGAN SPACE SURGICAL SITE INFECTION:

Infection occur within 30 days after the operative procedure if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operative procedure and the infection involves any part of the body, excluding the skin incision, fascia, or the muscle layers, that is opened or manipulated during the operative procedure and the patient has at least one of the following:

1. Purulent discharge from the drain that is opened through a stab wound into the organ/space.
2. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space.



3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of an organ/space SSIs by a surgeon or attending physician.

RISK FACTORS FOR SURGICAL SITE INFECTION:

From a general perspective, the microbes responsible for infection of surgical wounds originate from either the surrounding skin or associated structured that are contiguous with the regions of surgical procedure. The logical extension of this principle is that the risk of wound contamination and subsequent SSI depends on the location, the nature of the surgical wound/ incision, and he procedure performed.

Appropriately risk stratification for SSI cannot be limited to the wound alone. There are a variety of patient related factors and perioperative factors that can significantly affect the risk of SSI in a surgical patient.

MICROBIAL FACTORS:

The predominant source of microbes involves in SSIs originate from either the skin or the surrounding tissues of the incision, or from deeper structures involved in the operative procedure (e.g., enteric organisms in the bowel related surgeries). In the most recent NHSN surveillance report on 21,100 isolates from 2009 to 2010, the most frequently identified pathogens were, in order, staphylococcus aureus, Coagulase negative staphylococci, Escherichia coli, and enterococcus faecalis and pseudomonas aeruginosa.

RISK FACTORS FOR SSIs:

Patient factors:

- Age
- Nutritional status
- Diabetes
- Smoking
- Obesity
- Coexistent infections at a remote body site
- Colonization with micro organisms
- Altered immune response
- Length of preoperative stay

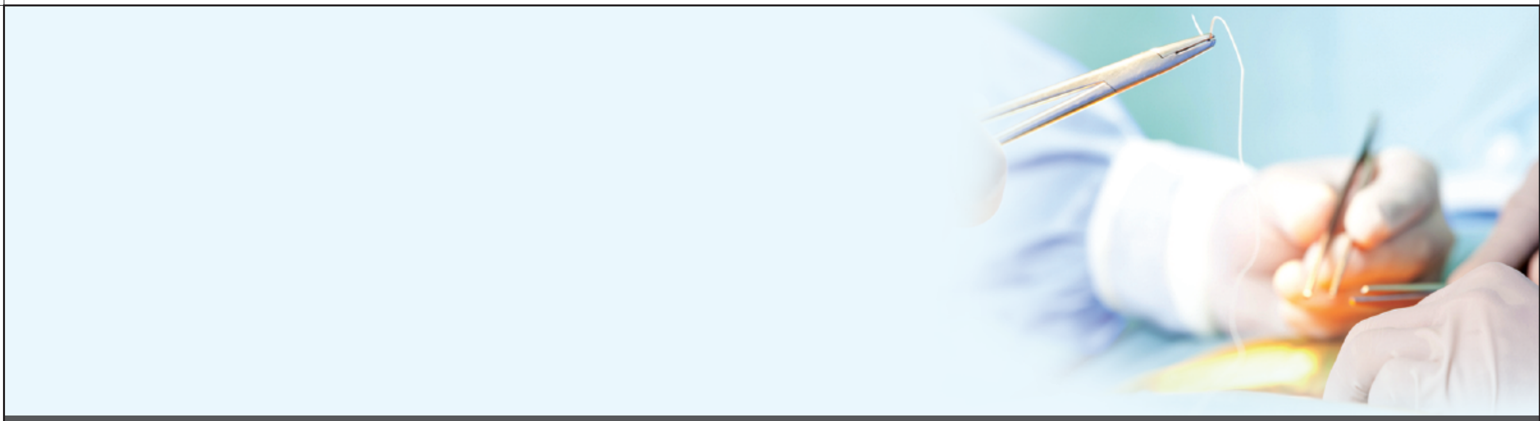
OPERATIVE FACTORS:

- Duration of surgical scrub
- Skin antisepsis
- Preoperative shaving
- Preoperative skin preparation
- Duration of operation
- Antimicrobial prophylaxis
- Operating room ventilation
- Inadequate sterilization of instruments
- Foreign material in the surgical site
- Surgical drains
- Surgical techniques
    - Poor hemostasis
    - Failure of obliterate dead space
    - Tissue trauma

In a Japanese study of 702 isolates, methicillin resistance in S.aureus was 72.0%. Community acquired MRSA is increasing in prevalence, with the prevalence of nasal colonization with MRSA in the general population increasing from, 8% to 1.5% from 2002 to 2002 to 2003 to 2004. Studies have attempted to clarify the relationship between colonization and risk of MRSA SSI.

PATIENT FACTORS:

Patient comorbidities can contribute significantly to the potential risk of SSIs. These factors include age, obesity, smoking, diabetes mellitus, malnutrition, dyslipidemia and immunosuppression. These factors are not directly accounted for in the NNIS classification scheme but can contribute significantly to the risk of



SSIs. Identification of these risk factors with appropriate preoperative history and physical examination is critical. The core principle for management of these patients relates risk factors is preoperative optimization.

Smoking results in significantly increased risk of SSIs because of its effects on local tissue perfusion. Large numbers of studies have consistently shown that smoking, additional studies and in meta-analysis of trial data. Recommendations are for smoking cessation at least 30 days before operation.

PREOPERATIVE FACTORS:

Preventative measures in the preoperative period have changes rapidly over the past few decades. A large volume of research has established the importance of a host of preventive measures in the operative period. Examples include skin decontamination, perioperative warming, and antimicrobial prophylaxis. As additional studies have been conducted with increasing methodological rigor, from observational studies to randomized controlled trials, refinements of existing preventative measures have further improved the efficacy of these measures. This review focuses on areas of prevention Those are the focus of significant active research or have seen recent change in key guidelines or recommendations.

Skin Decontamination:

The use of antiseptic agents topically has long been recommended for use in skin decontamination. The 2 broad classes of topical agents including chlorhexidine based preparations and iodophor based agents. In addition, these agents can be combined with isopropyl alcohol (IPA) in solution. Several studies have sought to address potential differences in efficacy between the various available agents, although there have been significant inconsistency of results, which have been also been confounded by methodological differences between the studies.

In the systemic review and meta-analysis conducted by Lee and colleagues, chlorhexidine based agents were found to reduce the risk of SSIs significantly.

In the most recent published cohort study by Hakkarainen and colleagues, there were no significant differences between 4 different preparations of skin antisepsis agents (chlorhexidine/IPA, chlorhexidine, providone-iodine, and iodine-povacrylex/IPA) in a cohort of primarily clean contaminated general surgical cases.

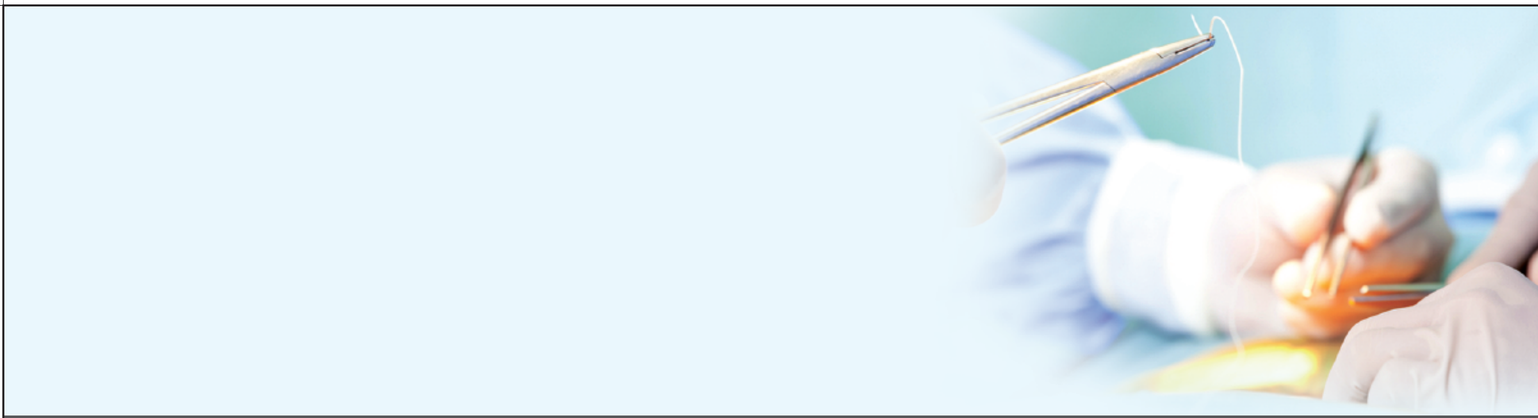
Antibiotic Prophylaxis:

From a historical perspective, routine antibiotic prophylaxis was questioned for the usefulness. With demonstrated clinical benefit in the clinical trials conducted separately by Polk and Lopez-Mayor and Stone and colleagues, there has been tremendous improvement in SSIs as an outcome. From the ontset, the development of antibiotic prophylaxis has undoubtedly led to a clear reduction in rates of SSIs. The complexity and nuance of clinical practice guidelines has continued to become more complex and refined.

Clinical practice guidelines for antimicrobial prophylaxis were recently updated in 2013 in a joint publication by the American Society of Health-System Pharmacists, focuses including timing of preoperative dosing, weight-based dosing, and duration of postoperative prophylaxis should be made with the primary consideration of the spectrum of coverage required. Current guidelines emphasize prophylaxis administration within 60 minutes of incision, or within 120 minutes for antibiotics requiring longer.

In the updated clinical practice guidelines, weight based dosing is an additional focus particularly in obese patients.

Adequate redosing of antibiotics for longer operative procedures is necessary for risk reduction. With longer procedures, serum and tissue concentration can drop below adequate levels, particularly in antibiotics with shorter half-lives(e.g. cefazolin, cefixitin, gentamicin) Additional route of antibiotic administration have been investigated in the past and have been historically ruled out. Topical routes of antibiotic



prophylaxis have been considered for some time. With the recent guidelines, there are no recommendations describing a role for topical routes of antibiotic administration.

Additional Measures:

Several additional measures have been investigated for implementation in the prevention of SSI. In many circumstances, recommendations have been equivocal due to the lack of evidence or the presence of often contradictory evidence. In these cases, guidelines are directed by expert opinion and experience. Further research is as a prime example, perioperative oxygenation was shown in 2 early trials to lead to the reduction of SSI rates with the use of 80% oxygen intraoperatively with immediately post operatively.

Perioperative measures with considerably less controversy include perioperative warming, hair removal, and optimization of the operating room environment. Perioperative hypothermia is associated with significantly increased risk of SSI. With regards to hair removal, the lowest risk of SSI is always associated with not removing hair. If hair needs to be removed because of interference of procedure, then hair removal should be done immediately before the surgery with a clipper or a razor.

THE ECONOMIC AND QUALITY OF CARE IMPACT OF SURGICAL SITE INFECTIONS:

The economic costs of SSIs are significant because of the volume of cases that were seen, with the annual 2.7 million operative procedures performed in the United States. Even with a conservative estimate of more than 290,000 cases of SSI. There is a substantial economic cost to the management of SSI. There is wide variance in estimates of the attributable costs of SSI infection that depends heavily on the type of surgical procedure and the geographic region studied.

SUMMARY:

SSIs remain the very important component of patient outcome, contributing to substantial patient morbidity. From a historical perspective, there has been a significant improvement in postsurgical outcomes, but these incremental gains have slowed in the recent decades. The translation of basic and clinical research has expanded the complexity of evidence based guidelines for SSI prevention. The importance of SSI prevention has been heightened because of its association with institutional and regulatory quality control measures. Sustained research in multiple aspects of SSI prevention needs to continue to realize further gains in SSI prevention. A multidisciplinary and multifactorial approach to SSI is absolutely necessary to continue to improve these critical outcomes of surgery.

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Surgical Clinics of North America

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INTRA-ABDOMINAL INFECTIONS

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INTRODUCTION:

Intra abdominal infections (IAI) represent diverse disease processes and therapies; however, earlier diagnosis with readily available CT imaging, advanced therapeutic techniques of interventional radiology, improvement of antibiotic efficacy, and evolving critical care medicine have all combined to improve patient outcomes.

IAI are divided into complicated and uncomplicated types. Uncomplicated IAI affect the single organ and do not spread to the peritoneum. In these cases, there is no anatomic disruption of gastrointestinal tract. Complicated IAI describes an extension of the infection into the peritoneal space. It may be localized, as in case of intra-abdominal abscess. For the insult that is not contained, diffuse peritonitis may ensue. The resultant physiologic response may develop into a systemic inflammatory response syndrome (SIRS).

In addition for the type of infection, patient stratification serves as an important guide for the treatment and will assist in with initial resuscitation, treatment options, specifically, antimicrobial therapy. Patients are divided into low risk and high risk categories that take into account the patient's history, the type of infection, and the resulting physiologic derangements.

Low-risk patients typically have community acquired infections of mild to moderate severity (perforated appendicitis or diverticulitis). The underlying physiologic status in these patients is not compromised. High-risk patients on the other hand are used to define patients who are at risk for multi-drug resistant organisms, failure of source control (SC), and ultimately, increased mortality. Predetermined patient specific and disease-specific factors act together to determine patient morbidity and mortality.

Characteristics of high-risk intra-abdominal infection.

Patient-specific factors

- Advanced age (>70)
- Immunosuppression
    - Poor nutrition status
    - Corticosteroid therapy
    - Organ transplantation
- Presence of malignancy
- Pre-existing chronic conditions
    - Liver disease
    - Renal disease

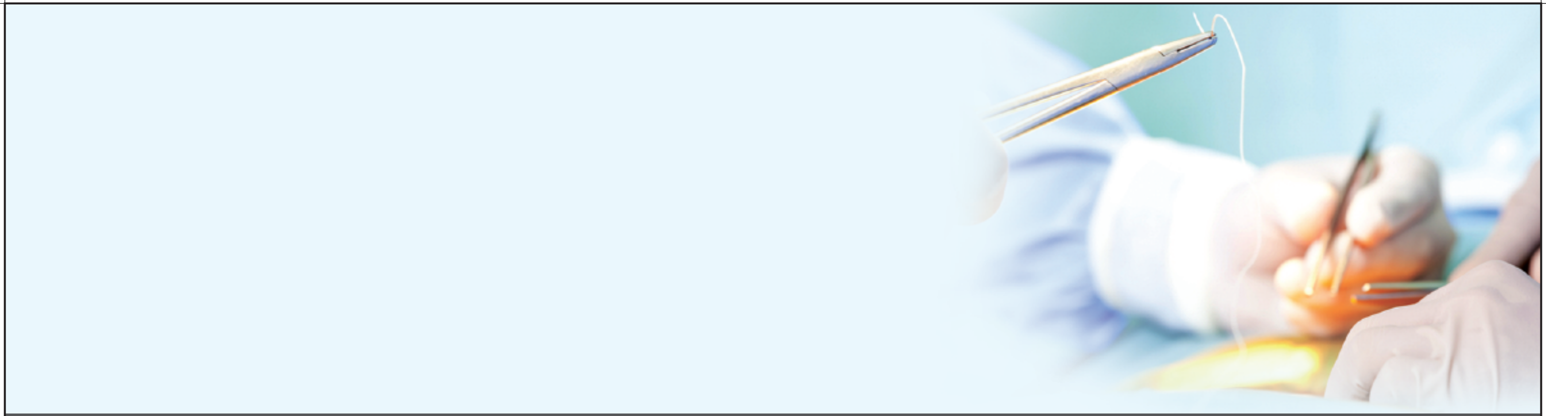
Disease-specific factors

- High APACHE II score(>15)
- Health care associated infection
- Inability to obtain source control.

DIAGNOSIS:

Diagnosis of IAI should be suspected in patients with SIRS and gastro intestinal dysfunction. Essential components of the history include any recent surgeries, and the presence of vomiting, diarrhea and constipation. Although physical examination findings are notoriously non-specific, particular findings may give insight. Pain out of proportion to examination is classically associated with acute mesenteric ischemia. Inguinal and umbilical hernia examinations are important to rule out the source of obstruction or incarcerations. Although minimally invasive surgery is increasingly common, abdominal scars are always important to know.

Laboratory workup begins with the assessment of complete blood count and serum electrolytes. Liver function test, amylase and lipase may be added if clinical concern includes hepatobiliary or pancreatic pathologic abnormality. In patient with SIRS and a concern for sepsis, further assessment of end organ perfusion and signs of oxygen debt should be assessed (i.e., serum lactic acid, superior venacaval/ mixed venous oxygenation saturations, arterial blood gas for base deficit).



Initial radiographic imaging should include a CT scan with oral and intravenous (IV) contrast to maximize sensitivity and specificity, oral contrast helps to differentiate bowel loops from adjacent fluid collections and may help guide subsequent drainage procedures. IV contrast helps delineate inflammation, identify hemorrhage, and visualize abscess walls. CT is useful in identifying small areas of free intra abdominal air (pneumoperitoneum) associated with hollow viscous perforation, and in the biliary tree, and air within the intestinal walls (pneumotosis intestinalis). The exception to this is if biliary pathologic abnormality is suspected (right upper quadrant pain, nausea, and vomiting), then right upper quadrant ultrasound is the higher yield.

Microbiologic diagnosis is not important in community acquired IAI because empiric antibiotic therapy is initiated based on clinical impression and risk factors. In the cases of high risk patients, blood and intra abdominal cultures are necessary to guide anti microbial therapy due to the higher risk for multi drug resistant organisms.

One of the most urgent clinical circumstances is the patient present with peritonitis (abdominal rigidity, guarding, and rebound tenderness). These signs are concerning for pending hemodynamic collapse and urgent evaluation and disposition are necessary. Early hemodynamic assessment is a priority; if adequate (systolic blood pressure>90mmHg), there may be a time for further workup. On the other hand, unstable patients (systolic blood pressure <90mmHg) and the need for vasopressor support indicate the need of emergent laparotomy for diagnostic and therapeutic purpose with the understanding that the risk of mortality is higher than in a stable patient.

TREATMENT:

The principles of treatment require simultaneous resuscitation, SC, and anti-microbial therapy. If not aggressively managed, IAI may progressed to severe sepsis, septic shock, and death.

Resuscitation:

Intravascular volume depletion should be expected in patients with IAI. A thorough history and physical examination may aid with guiding resuscitation.

It has been learned from the Surviving Sepsis Campaign (SSC) that fluid resuscitation should be initiated after diagnosis of sepsis is suspected. The strategy of early gold directed therapy has been shown to decrease mortality.

Source control:

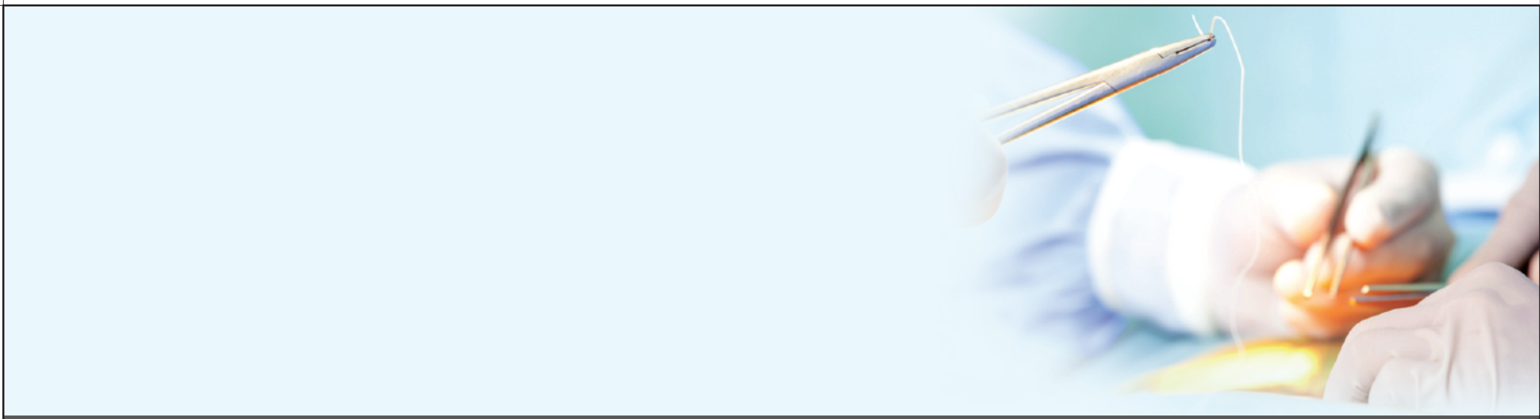
SC is a fundamental surgical principle and is defined as the ability to effectively eradicate the infection (i.e. purulent fluid or tissue) and control leakage (i.e., drainage of ongoing enteric contamination) by whatever means necessary.

In general, the least invasive procedure that is safely able to eradicate the infection is preferred. Percutaneous image guided drainage is preferred for isolated IAI that are anatomically amenable to drainage. Surgical debridement, whether laparoscopic or open, remains the mainstay of therapy for failed percutaneous control.

Antibiotics:

Although secondary to adequate SC, appropriate and timely empiric antibiotic coverage is imperative. In appropriate coverage increases hospital stay, postoperative abscesses and mortality that cannot be reversed if subsequent and appropriate antibiotics are added later in the clinical course. In severe sepsis, appropriate coverage should be started within one hour as recommended by SSC. Patient with IAI are divided into low-risk and high-risk category to stratify the risk for developing complicated infections. In general, beta Lactams/Beta Lactamase (penicillins, cephalosporins, carbepenems, monobactams) antibiotic will provide adequate empiric coverage for low risk patients.

High risk patients on the other hand are at the risk for more resistant microbiologic flora. Specifically,



this include gram negative Pseudomonas Aeruginosa and Acinetobacter species, extended spectrum beta lactamase producing Klebsiella species, Escherichia Coli, enterobacter species, proteus species, methicillin resistant staphylococcal aureus (MRSA), enterococci and candida species. Empiric therapy are institution specific and should be adjusted for individual hospitals/ unit antibiograms. Historically, studies have suggested that antibiotics should be continued until the patient has resolved leukocytosis or fever and is tolerating oral diet, and that may not be necessary.

SUMMARY:

IAI arise from many sites and range from moderate nuisance to life threatening. Prompt identification, diagnosis and treatment allow optimal patient outcomes. Resuscitation from shock, early appropriate antibiotic administration, and control of the source of infection are necessary components of a 3-pronged approach. Initial antibiotic administration should be broad spectrum and tailored to the most likely pathogen and then narrowed to the best agent for appropriate duration. SC may be obtained using radioghraphically placed percutaneous or traditional operative clinical condition. Patient-specific factors (advanced age and chronic medical conditions as well as disease-specific factors health-care associated infections and inability to obtain SC) combined to affect patient morbidity and mortality.

Duration of antibiotic treatment after appendicectomy for acute complicated appendicitis

Summarized by:
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INTRODUCTION:

Acute appendicitis is still the most common intra-abdominal infection requiring surgical intervention. Definitions of severity can be assigned to acute appendicitis, but grossly the disease can be divided into two entities: uncomplicated or non-perforated, or complicated disease with perforation of the appendix or the presence of purulent peritonitis. Several randomized clinical trials have shown the feasibility of antibiotic treatment alone for uncomplicated appendicitis, although it is associated with considerable recurrences requiring appendicectomy within 1 year. Therefore, appendicectomy is still considered the treatment of choice for acute appendicitis. The most frequent complication after appendicectomy is infection, seen as wound infection (3.6 percent for laparoscopic surgery and 7.3 per cent for open surgery) and intra-abdominal abscess (1.6 and 0.6 per cent respectively). The latter is often associated with readmission and need for reintervention. As expected, these complications are more frequent after complicated appendicitis.

Perioperative administration of antibiotics has been proven to reduce the number of infectious complications in acute appendicitis. Complicated appendicitis is commonly treated by a prolonged antibiotic regimen, although there is no consensus on the exact duration. American guidelines advise restriction of postoperative antibiotic treatment of complicated intra-abdominal infections to 4-7 days. Continuing antibiotics for more than 5 days does not provide further benefit, although the available evidence is restricted mainly to children. Currently, many clinics continue treatment for between 3 and 5 days after surgery for complicated appendicitis depending on local protocols. However, there is only limited evidence available on duration of antibiotic treatment after appendicectomy for complicated appendicitis in adults. This study compared outcomes between two hospitals practicing different durations of antibiotic treatment in adults with complicated appendicitis.

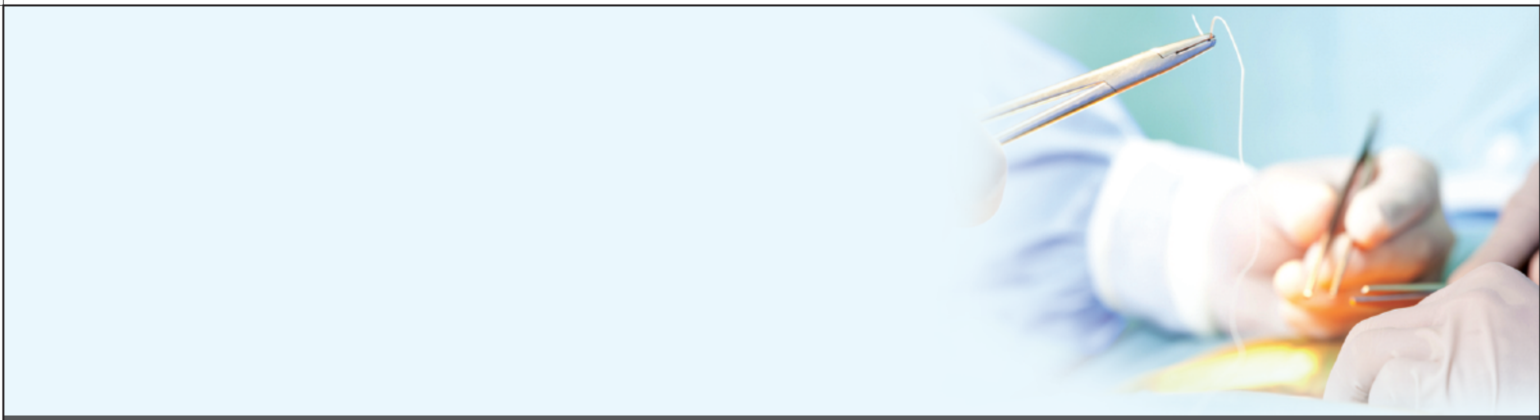
METHODS:

This was an observational cohort study of all adult petients who had an appendecectomy between January 2004 and December 2010 at either one of the two hospitals less than 7 km apart at Hilversum and Blaricum (location A and B respectively) in the centre of the Netherlands. The original article was published in march 2014 in british journal of surgery. At location A, the protocol included 3 days of postoperative antibiotic treatment, whereas at location B it specified 5 days. The primary outcome was the development of postoperative infections as either superficial wound infection or deep intra-abdominal infections.

All patients received a single intravenous dose of cefamandole (1000mg) and metronidazole (500mg) as antibiotic prophylaxis before induction of anaesthesia. For complicated appendicitis, defined as a perforation of the appendix before or during operation, or appendicitis in the presence of purulent peritonitis, antibiotic treatment was continued for 3 or 5 days after surgery, depending on hospital. The therapeutic antibiotic regimen was cefuroxime (750 mg 3 times daily) and metronidazole (500 mg 3 times daily), administered intravenously. During the study interval, the standard duration of antibiotic treatment was 3 days at location A and 5 days at location B.

RESULTS:

Between January 2004 and December 2010, 1232 adult patients underwent surgery for suspected appendicitis. In 89 patients the appendix was not infected or another diagnosis was found as the primary cause; 1143 patients with an intraoperative diagnosis of acute appendicitis underwent apppendicectomy. Of these, 597 procedures were performed at location A and 546 at location B. Half of the patients were men, mean age was 42 years and mean duration of hospital admission was 3.7 days.



An open appendicectomy was done frequently than a laparoscopic procedure (655 versus 488; 7.4% converted). The laparoscopic technique was introduced from the end of 2006, and this technique prevailed during the final years. Mean operating time 51 min, 43 min for open surgery and 61 min for laparoscopic surgery.

Infectious complications developed following appendicectomy in 4.6% of patients; 3.1% developed an intra-abdominal abscess and 2.0 per cent a wound infection. A laparoscopic approach was identified as a risk factor for development of an intra-abdominal abscess (OR 2.06, 95% confidence interval 1.04 to 4.10; P= 0.039). An open approach proved to be a risk factor for wound infections (OR 3.62, 1.22 to 10.69; P=0.020).

Table 1 Baseline characteristic of complicated appendicitis

	Total (n=267)	Location A (n=126)	Location B (n=141)
Mean age (years)	49	51	46
Sex ratio (M:F)	142:125	70:56	72:69
Appendicectomy			
Open	180 (67.4)	54 (42.9)	126 (89.4)
Laparoscopic	67 (32.6)	72 (57.1)	15 (10.6)
Converted	19 (22)	19 (26)	0 (0)
laparoscopy			
Mean operating time			
Open	52	74	42
Laparoscopic	77	82	53
Type of complicated disease			
Preoperative perforation	212 (79.4)	101 (80.2)	111 (78.7)
Intraoperative perforation	22 (8.2)	8 (6.3)	14 (9.9)
Purulent peritonitis	33 (12.4)	17 (13.5)	16 (11.3)

COMPLICATED APPENDICITIS:

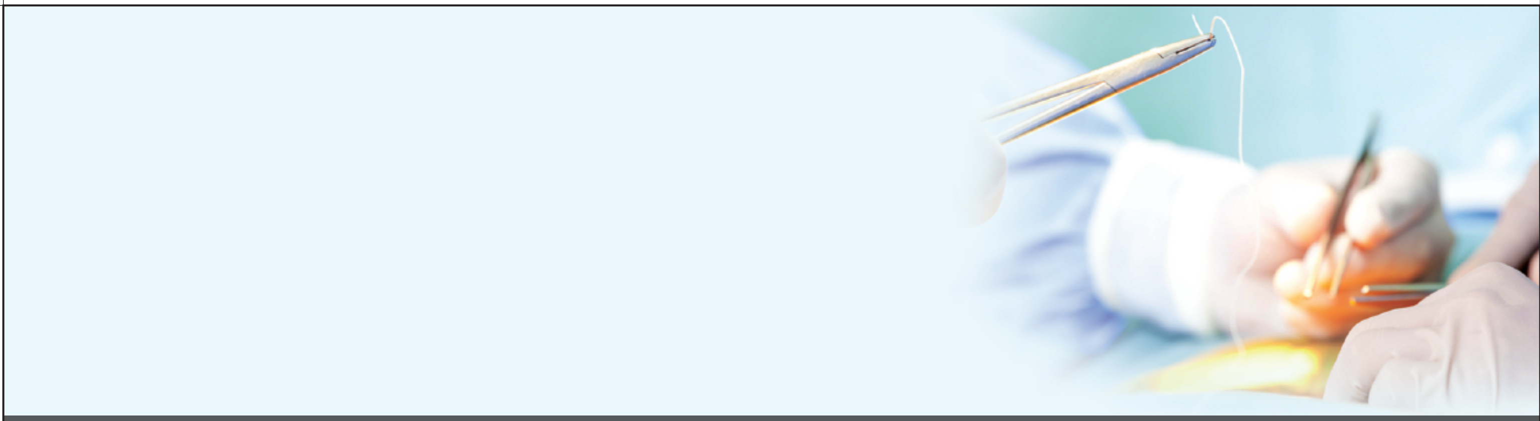
Complicated disease in 267 patients (23.4 per cent) was treated after surgery with either 3 or 5 days of antibiotics, according to the local protocol. Baseline characteristics of patients with complicated appendicitis are shown in table 1. Complicated appendicitis was a risk factor for infectious complications compared with uncomplicated disease (OR 3.59, 2.04 to 6.29; P< 0.001). In the event of complicated appendicitis, the antibiotic regimen was prolonged for 3 days in 135 patients (50.6 per cent) and 5 days or more in 123 patients (46.1%). Antibiotic treatment lasted longer than 5 days in seven patients at location B. In nine patients (3.4%) the exact duration of antibiotics could not be retrieved. The median duration of hospital admission was 4 and 6 days in patients who received antibiotics for 3 and 5 days respectively (P<0.001).

Among the patients with continued antibiotic treatment because of complicated disease, 21 (7.9%) developed an intra-abdominal abscess and nine (3.4 per cent) a wound infection. The intraoperative diagnosis in those who developed an abscess was perforation at the start of surgery in 20 patients and purulent peritonitis in one. No difference was found between antibiotic treatment for 3 or 5 days in terms of developing an infectious complication. This was the case for both intra-abdominal abscess (OR 1.77, 0.68 to 4.58; P=0.242) and wound infection (OR 2.74, 0.54 to 13.80; P= 0.223).

In univariable analysis, laparoscopy was identified as a statistically significant factor for abdominal abscess formation (P= 0.049). However, laparoscopy was not an independent risk factor for any infectious complications in multivariable analysis.

In 16 of 126 patients treated at location A, the specified 3-day antibiotic treatment period was prolonged for 2 days (total 5 days) because clinical findings were suggestive of infectious complications. Two of these patients developed an intra-abdominal abscess. Because the prolonged antibiotic treatment in these patients was not in accordance with the local protocol, these patients were excluded from a sensitivity analysis. In this analysis, comparable results were found for the effect of duration of antibiotic treatment (3 versus 5 days) for development of any infectious complication (OR 2.44, 0.48 to 6.30; P= 0. 168) or an intra-abdominal abscess (OR 2.17, 0.75 to 6.30; P= 0.153).

In addition, some patients at location B received



antibiotics for a shorter or longer time (3 days or more than 5 days) than the 5 days specified in the protocol. These patients were excluded from the final analysis together with those who received prolonged antibiotic treatment at location A. No differences were found on the impact of duration of antibiotic treatment (3 versus 5 days) on development of any infectious complication (OR 1.92, 0.68 to 5.40; P= 0.219), a wound infection (OR 1.50, 0.25 to 9.18; P=0.661) or an intra-abdominal abscess (OR 2.63, 0.80 to 8.71; P= 0.112).

Table 2 Univariable logistic regression analysis of risk factors for all infectious complications and intra-abdominal abscesses after appendicectomy for complicated appendicitis

	Prevalence in the first group (%)	All infectious complications Odds ratio	P	Intra-abdominal abscess Odds ratio	P
Antibiotic treatment (3 versus % days)	50.6	1.70 (0.72, 4.01)	0.223	1.77 (0.68, 4.56)	0.242
Sex (M versus F)	53.2	1.03 (0.46, 2.32)	0.943	1.19 (0.48, 2.30)	0.705
Age (>50 years < 50 years)	39.7	0.94 (o.41, 2.17)	0.892	1.08 (0.43, 2.69)	0.876
Operator (resident versus surgeon)	52.4	1.07 (0.47, 2.40)	0.879	1.23 (0.50, 3.02)	0.653
Location (A versus B)	47.2	1.34 (0.60, 3.03)	0.475	1.91 (0.77, 4.78)	0.165
Approach (laparoscopic versus open)	32.6	1.90 (0.84, 4.30)	0.125	2.46 (1.00, 6.04)	0.049

DISCUSSION:

This study found no difference in the rate of infectious complications between antibiotic treatment of perforated appendicitis for 3 or 5 days. Available data on duration of treatment are limited, with only one randomized clinical trial in adults comparing the duration of antibiotic administration. That study reported no additional benefit from standard treatment with antibiotics for atleast 5 days compared with antibiotic treatment based on the clinical course; the mean antibiotic duration was 5.9 versus 4.3 days, with infectious complication rates of 13 versus 12.5% respectively. Other investigations of the optimal duration of antibiotic treatment in perforated appendicitis are scarce and limited mainly to children. In most pediatric studies, a duration of more than 5 days has been compared with antibiotic treatment for 5 days.

Almost all patients who developed an intra-abdominal abscess after prolonged antibiotic treatment in this study (20 of 21) had perforation as an intraoperative diagnosis at the start of the surgery, rather than purulent peritonitis or gangrenous appendicitis with perforation on manipulation during surgery. This is in line with previous findings that patients with the perforated appendix are at a much higher risk of postoperative abscess formation than patients with a non-perforated, purulent or gangrenous appendix.

In the present cohort, patients who had a laparoscopic appendicectomy more frequently developed intra-abdominal abscess than those who underwent open appendicectomy. This confirms previous findings, although the cause is still not fully understood. However, for the subgroup of patients with complicated appendicitis, laparoscopy was not a risk factor in multivariable analysis. This implies that a laparoscopic approach can still be used in patients with preoperative suspicion of complicated appendicitis without the risk of infectious complications.

The type of stump closure in laparoscopic appendicectomy has been shown to influence postoperative infectious complications with the evidence favoring endostapling. In the present cohort, all appendicular stumps were closed with the stapling device in laparoscopic procedures. The conversion rate among complicated cases attempted laparoscopically was relatively high, probably because the study was carried out at the time when the laparoscopic approach was introduced.

The study included only clinically relevant in-hospital infectious complications (intra-abdominal abscess and wound infection) that altered the treatment, such as readmission, re-intervention or antibiotic treatment.

Therefore, the number of such complications is probably under-reported; this applies specially to wound infections, which can often be treated in the outpatient clinic. However, any underestimation of the complication rate would be expected to apply equally to both groups. Moreover, reintervention such as percutaneous drainage without the need for readmission were registered, because these were recorded in the electronic patient database.

The length of hospital stay was significantly shorter in patients who received antibiotics for 3 days compared with the treatment for 5 days. Although no cost analysis was performed, lower costs can be expected with 3-day antibiotic regimen. Some clinics switch their antibiotic regimen from intravenous to oral administration if possible, to reduce hospital stay. This was not done in the authors' clinic owing to the choice of antibiotics, resulting in a longer hospital stay for 5-day group.

This is a retrospective study, which has its limitations and risk of bias. For example, the open and laparoscopic approaches were not divided equally between the two locations. On the other hand, a laparoscopic approach was a risk factor in the development of an intra-abdominal abscess and this approach was chosen more often at location A, where a 3-day antibiotic regimen was used. Despite the shorter regimen in this hypothetically high risk group, infectious complications were not increased compared with the rate in the 5-day group.

At both locations the duration of antibiotic treatment in some patients differed from that specified in the local protocol. The sensitivity analysis carried to account for both protocol violations (either lengthening or shortening of antibiotic regimen) yielded results comparable to those of the main analysis. Finally, owing to the proximity of the two hospitals, the study groups were well matched. During the time of this study, the surgical departments of the two hospitals already worked together on many levels, although each department still had its own protocols. Those hospitals and their surgical departments have now merged, resulting in a antibiotic treatment for 3 days for complicated appendicitis.

DISCLOSURE:

The authors declare no conflict of interest.

REFERENCE:

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CASE STUDY

Summarized by:
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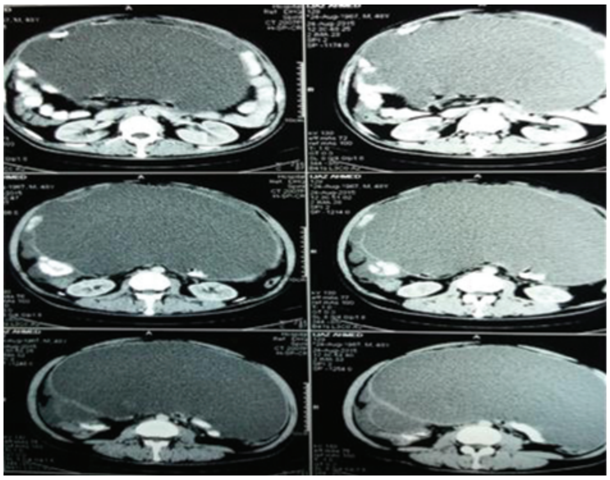
Dr. Naeem Khan Consultant - Surgeon
JPMC, Karachi

48 years old male presented with abdominal pain and distention for 5 month. On examination abdomen was mildly distended. Ultrasound was done which showed marked thick gelatinous ascites. Posterio-lateral displacement of liver, spleen and kidney

CT scan showed huge well encapsulated cystic mass with internal debris and echoes. It is displacing the gut loops laterally. FNAC smear reveal lymphocytes and occasional mesothelial cells. No malignant cells seen. CEA LEVEL:- 45.4



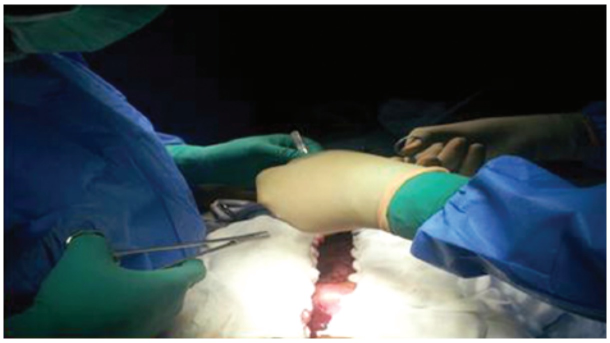
PROCEDURE :- Exploratory laparotomy + debulking of cyst (intestinal origin). Findings were Cyst extending from epigastric region to pelvis containing 4 lit of gelatinous fluid (done in periphery hospital) **HISTOPATHOLOGY** showed Mucinous cyst adenoma showing low grade dysplasia with pseudomyxoma peritonei.

IMMUNOHISTOCHEMISTRY: CK 7- NEGATIVE. CK20-POSITIVE, CDX2-POSITIVE.

Expert opinion was taken from DR. PAUL SUGARBAKER (Washington cancer institute). He said I would recommend a cytoreductive surgery and Hyper thermic Intra Peritoneal Chemotherapy.

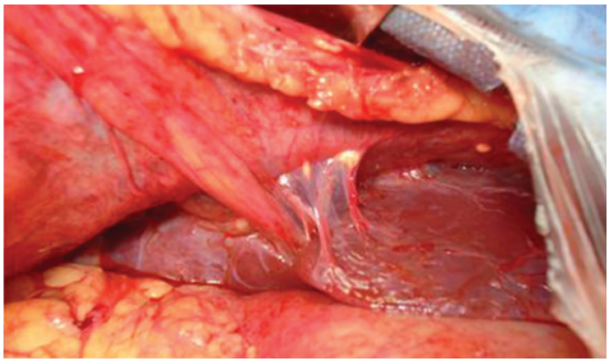
PROCEDURE

Cytoreductive surgery + HIPEC procedure

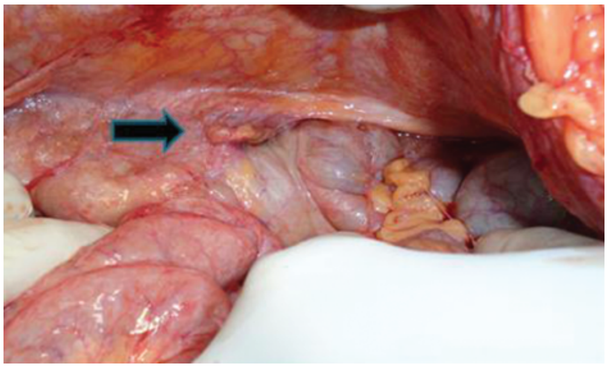


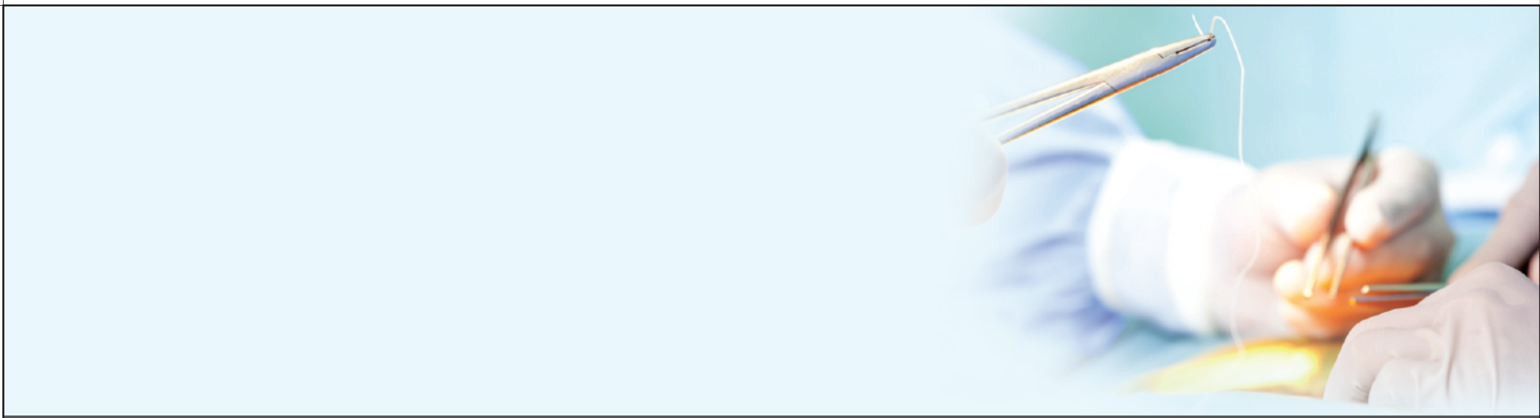
Findings were 300ml of fluid in peritoneal cavity. Adhesion of intestine with abdominal wall. Deposits of jelly like material in peritoneal cavity, colon and mesentery of small intestine. Tumor deposits on omentum.

Tumor deposit on right and left lobe of liver and falciform ligament

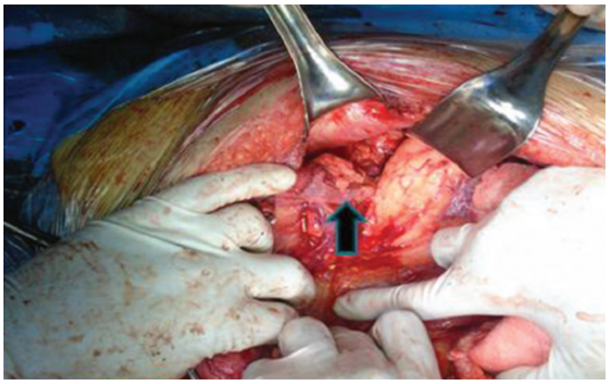


Seedling on left side peritonium

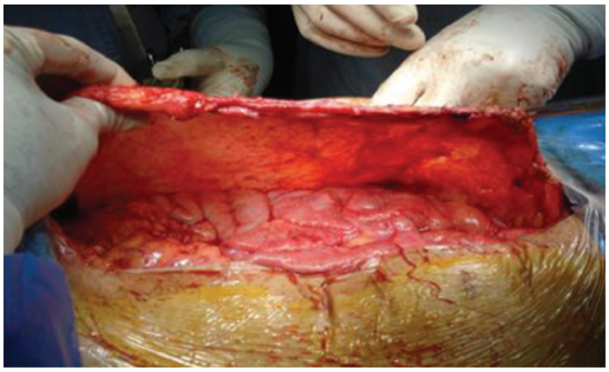




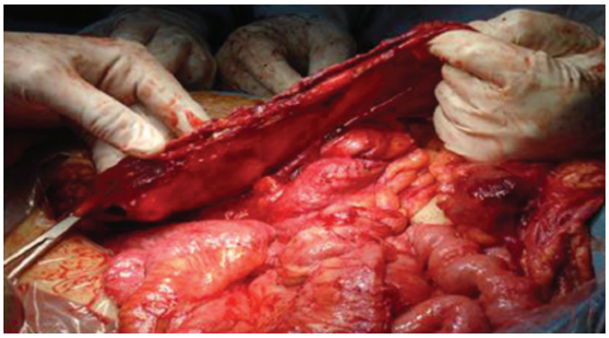
Tumor deposit in caecum



Peritonectomy of left side of abdomen

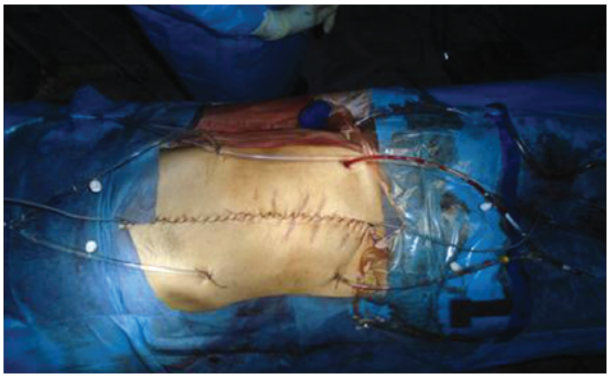


Peritonectomy of right side of abdomen and pelvic area



After cytoreductive surgery hypothermic intraperitonial chemotherapy was given by inserting two inflow catheters one in Right paracolic gutter other one in Left paracolic gutter, two outflow catheters were inserted in palvic cavity.

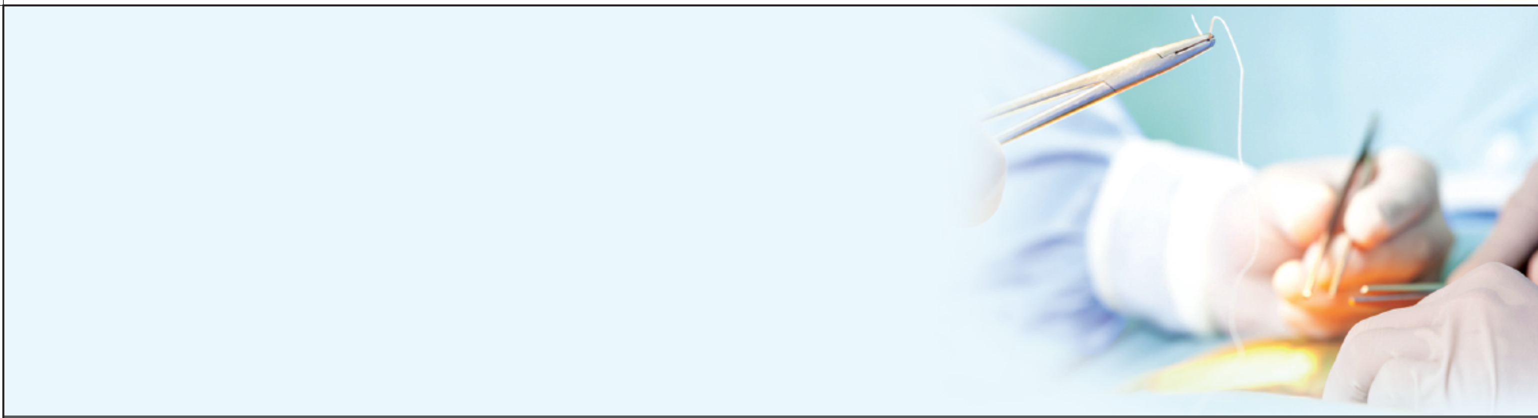
Two thermocouples were also placed to continuously monitor the inflow, outflow, and temperature. Intraperitoneal temperature was maintained at 39-40. Intraperitoneal chemotherapy drugs was Mitomycin C. Mean flow rate of 1L/min was maintained for 90 minutes



Patient discharged uneventfully on 11th post-operative day.

PSEUDOMAXOMA PERITONIE is false Mucinous tumor of the peritoneum. It is Characterized by diffuse intra-abdominal gelatinous collections (jelly belly) With mucinous implants on peritoneal surfaces & omentum. The disease remains localized to the peritoneal cavity. Lymphatic, parenchymal, or extraperitoneal spread of disease is rare. This is an unusual low-grade malignancy arising from goblet cells of the large bowel or appendix and Mucin-producing carcinomas of the Overies.

Recent publication from the Netherlands reporting on a nationwide epidemiological and pathological database, suggests that the Incidence is approximately TWO per MILLION, per YEAR. Tumor most often originates in the ovary or appendix.Most acknowledge that predominantly originates in the appendix. In women synchronous ovarian and appendiceal disease is common. IMMUNO-HISTOCHEMISTRY AND MOLECULAR GENETIC techniques support that ovarian tumour is metastatic from perforated appendiceal mucinous tumour.



ETIOLOGY: Recently, the primary tumour appears to arise from the MUC-2 over expressing of goblet cells, suggested as a molecular marker for PMP of intestinal rather than ovarian origin. The K-Ras (p53) gene may be involved in the oncogenesis.

Space of distribution is Recto-vesical pouch, Retro-hepatic space, Paracolic gutter. Complete, or nearly complete, absence of tumour masses on the freely mobile intestinal surfaces, small bowel, stomach and transverse colon. This tumor mostly present 27% with appendicitis, 23% with increasing abdominal distension ,14% with a new onset hernia and 39% with ovarian mass.

Pathological classification

Low-grade Tumours as disseminated peritoneal adenomucinosis (DPAM).
High-grade Tumours as peritoneal mucinous carcinomatosis (PMCA).
Intermediate Group (IG)

Characteristic of 2 Main Groups of PMP

	DPAM	PMC
INITIAL Appendiceal tumor Macroscopic appearance	Mucinous Adenoma Mucinous Ascities	Mucinous Adenocarcinoma Carcinomatosis with zone of infiltration.
Cellularity	Low	Moderate
Cellular Atapia	Minimal	Modrate
Mitosis	Rare	Few-Frequent
Nodal invasion	Rare	Frequent
Invasion of adjacent	Rare	Frequent
Servival at 5 years	80%	10%

Pre-operative Assessment :- ***Ct Abdomen is currently imaging modality for the diagnosis and staging. CT or ultrasound (US)-guided biopsy may be useful. Tumor markers like CEA, CA-125 and CA19-9.*** **TREATMENT IS CYTOREDUCTIVE SURGERY WITH HYPERTHERMIC INTRAPERITONIAL CHEMOTHERAPY.**

HYPERTHERMIC INTAPERITONIAL CHEMOTHERAPY is to deliver Chemotherapy drug directly to the cancer cells in abdomen cavity. Intraperitonial temperature is maintained up to 40-42 to eradicate microscopic residual disease and augment penetration of drug in tissues. Synergize cytotoxicity of chemotherapy and minimizes rest of the body exposure to chemotherapy. **COMPLICATIONS** are lengthy procedure Complete cytoreduction takes 6-10 hr. other complications are Haemorrhage, Thromboembolism, 30-40% SEPSIS complication associated with HIPC i.e. (INTESTINAL FISTULA, ANASTOMOTIC LEAKAGE, NUETROPENIA). Post Operative follow up:- ***After every 3month for 2 years then 6th month with interval CT scan abdomen.*** Repeat Tumor Marker If raised suggest recurrence

REFERENCE:

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Quiz

Following a mastectomy and axillary clearance 2 months earlier, a 50 year old female presents to follow up breast clinic. Her main complaint is of difficulty combing her hair following the procedure. Which peripheral nerve has been most likely injured at procedure?

Please select one of the following:

- **Radial nerve**
- **Ulnar Nerve**
- **Axillary Nerve**
- **Thoracodorsal nerve**