

Recurrent Abdominal Burst after Obstetric Surgical Procedure

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ABSTRACT

Introduction: Abdominal burst due to obstetric surgery complications is still a concern because it increases maternal morbidity and mortality.

Case description: There are 15 cases with abdominal burst obtained from 3,914 obstetric surgical procedures during 2013 to 2018 in Dr Soetomo General Hospital, with 5 cases (30%) of recurrent abdominal bursts. Preoperative risk factors are obtained from the host, such as anemia, hypoalbuminemia, and autoimmune diseases. Two recurrent abdominal burst cases occurred after cesarean section, and three cases occurred in hysterectomy after cesarean section, all of which used retention sutures as initial management, and in reality, it did not prevent repeated bursts. The whole case went to emergency surgery, and surgical site infection was obtained as an agent that aggravates the degree of disease. Selection of management and treatment is based on the patient's wound problems. Two cases required intensive and multidisciplinary care and used vacuum-assisted closure (VAC) and modified VAC. There were two patients (6.7%) who died from sepsis, while three other patients had well-closed wounds, and no complications have been found to date.

Conclusion: One-third of abdominal burst patients in Dr Soetomo General Hospital had recurrence involving long-term multidisciplinary care and required facilities and an optimal environment. The dominant risk factors are obtained from the inferior conditions of the host, such as anemia, hypoalbuminemia, and autoimmune diseases.

Keywords: Obstetric surgical procedure, Recurrent abdominal burst, Vacuum-assisted closure.

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INTRODUCTION

Abdominal surgery is sometimes done either in an obstetric or gynecology department. Cesarean section is the most common practice in abdominal surgery. In several countries, the number of cesarean section has increased, including that in Indonesia. Although considered safe to avoid maternal-neonatal complications, and despite the improvement in both operation and anesthesia technologies, abdominal burst as one of the cesarean section complications remains a concern, as it increases the number of maternal morbidity and mortality.¹ Abdominal burst is a postoperative complication that increases morbidity and mortality.² It is defined as an open postoperative wound in the abdomen, that in 20% to 45% of cases leads to internal organ release, which relates to the mortality rate in the perioperative period.³ Mortality rate in abdominal burst ranges from 15% to 45%, while the incidence rate ranges from 0.4% to 3.5% of all laparotomy surgeries.⁴ Most cases happen in the second week and the peak in the 10th-day post-operation.⁵ The separated sutures wound in the abdomen both partial, and complete must be treated immediately.

MATERIALS AND METHODS

This case report is a descriptive retrospective study. Fifteen cases of abdominal burst were found between January 2013 and June 2018 among 3914 per abdominal surgeries in obstetric department, we explained the risk factors (preoperative, operative, and postoperative), and the management of the cases, then we found five recurrent abdominal burst cases that happened after obstetric per abdominal surgery in Dr Soetomo General Hospital, either post-cesarean section or hysterectomy. The data was obtained through register data, serial morning case reports, operation reports, and medical records. The ethical clearance certificate was obtained from the ethical committee in Dr Soetomo General Hospital.

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CASE DESCRIPTION

From 15 cases of abdominal bursts happening after obstetric surgeries in Dr Soetomo General Hospital from January 2013 until June 2018, most of the patients aged 20 to 35 years (60%), with multiparity (87%). The characteristics of post-obstetric-operation abdominal burst in Dr Soetomo General Hospital, based on preoperative predisposition factors, dominated mostly by non-obstetric comorbidity, which are anemia and hypoalbuminemia in 12 cases (80%) with the mean Hb of 7.0 g/dL and the mean albumin 2.49 g/dL, followed by thrombocytopenia (33.3%, mean thrombocyte 42.340/ μ L), hypertension (26.7%), obesity (26.7%), autoimmune disease with steroid use (20%), and diabetes mellitus (13.3%). While the preoperative obstetric complication was mostly of puerperal sepsis (40%) followed by postpartum hemorrhage (33.3%). From 15 cases, 7 patients were found with Pfannenstiel

incision (46.7%), and the meantime of operation before abdominal burst happen was 129 minutes, mean of bleeding was 893 mL, and two-third of the cases (66.7%) were done by the resident/trainee. The thread used to close the fascia in two-third of cases is a polyglactin 910 (Safil®) multifilament thread, using the basting technique. Abdominal burst is found mainly in patients underwent hysterectomy post caesarian section (73%), or directly after caesarian section (20%) with surgery area infection in most cases (93.3%) and increased intra-abdominal pressure due to ileus (40%) and cough (26.7%) while in postoperative care. Five patients (33.3%) with abdominal burst were readmitted to the hospital with an infection in the surgery area (Table 1).

In all abdominal burst cases reported, intravenous prophylaxis antibiotic cefazolin was injected before incision (dose 2 g in 30 minutes). While the antibiotic injection postoperatively before abdominal burst was done in 11 patients, 2 patients were not given the postoperative antibiotic injection, and the postoperative antibiotic injection data for the other 2 was not found. The initial antibiotic administration was given empirically, before culture (Table 2).

In five cases (30%), recurrent abdominal burst happened after repairing. In all recurrent abdominal burst cases, postoperative infection predisposition factors were found. Two deaths (13.3%) were found on day 23 and 39 due to sepsis.

In five recurrent abdominal bursts, culture of tissue and pus was done serially, with gram-negative bacteria as the main pathogen (Table 3).

Proteus mirabilis is a pathogen in the urinary tract, can also cause wound infection, sepsis, and pneumonia in hospital care patients. Another pathogen that slows down the healing process in the abdominal burst is ESBL (+) bacteria, e.g., *Escherichia coli* and *Klebsiella pneumoniae* (Table 4).

DISCUSSION

In this case report, we examine wound complication incidence after 3,914 per abdominal surgeries in obstetric department done in Dr Soetomo General Hospital from January 2013 until June 2018, shows the abdominal burst rate is 0.4%, and the mortality rate of all abdominal burst cases is 6.7%, which increased the maternal death rate in RSUD Dr Soetomo by 0.02%. This confirms the international data showing that abdominal burst incidence ranges from 0.4% to 3.5% and is related to the high mortality rate, reaching 45%.⁶ This case shows one-third (30%) of abdominal burst patients experienced recurrency that prolonged the hospital care and affected the physical, mental, and social conditions either in patients or their families.

Postoperative abdominal burst, in Dr Soetomo General Hospital mostly occurs during 8 to 14 days post-operation with a mean onset of 10 days, this is consistent with the literature showing that the peak of abdominal burst is at day 10 post-operation.⁵ Abdominal burst is related to preoperative, operative, and postoperative predisposition factors, e.g., nutrition, comorbidity, labor process, infection, operation technique, and postoperative care, stated in this study. The majority of preoperative predisposition factors are usually hosted factors, e.g., anemia (80%), and hypoalbuminemia (80%). This corresponds with previous studies, stating that major preoperative predisposition factors, e.g., anemia, hypoproteinemia, hypoalbuminemia is related to increment in abdominal burst incidence rate. Anemia (Hb below 10 g/dL) affects the healing process as hemoglobin plays a role in distributing oxygen to the

Table 1: Characteristics of abdominal burst patients in Dr Soetomo General Hospital

Variable	Abdominal burst (n = 15) (%)	Recurrent abdominal burst (n = 5) (%)
<20 years	1 (7)	1 (20)
20–35 years	9 (60)	3 (60)
>35 years	5 (33)	1 (20)
Parity status		
Primipara	2 (13)	0 (0)
Multipara	13 (87)	5 (100)
Location of initial obstetric care		
Dr Soetomo General Hospital	7 (47)	3 (60)
Other hospital	8 (53)	2 (40)
Preoperative risk factors (Non-obstetric)		
Anemia	12 (80)	3 (60)
Thrombocytopenia	5 (33.3)	3 (60)
Hypoalbuminemia	12 (80)	3 (60)
Diabetes mellitus	2 (13.3)	1 (20)
Hypertension	4 (26.7)	1 (20)
Obesity	4 (26.7)	1 (20)
Autoimmune disease and steroid use	3 (20)	3 (60)
Malignancy	0 (0)	0 (0)
Lung disease (Obstetric)	0 (0)	0 (0)
Puerperal sepsis	6 (40)	1 (20)
Postpartum hemorrhage	2 (13.3)	2 (40)
Postoperative risk factors		
Hospital readmission	5 (33.3)	1 (20)
Cough	4 (26.7)	3 (60)
Operation area infection	14 (93.3)	5 (100)
Ileus	6 (40)	3 (60)
Organ rupture	2 (13.3)	0 (0)
Abdominal burst onset		
<7 days	5 (33.3)	2 (40)
8–14 days	6 (40)	2 (40)
>14 days	4 (26.7)	1 (20)
Mean	10 days	11 days
Operative risk factors		
Incision type		
Midline	5 (33.3)	2 (40)
Pfannenstiel	7 (46.7)	2 (40)
T-inverse	3 (20)	1 (20)
Operation duration		
<60 minutes	4 (26.7)	2 (40)
60–180 minutes	5 (33.3)	2 (40)
>180 minutes	6 (40)	1 (20)
Mean	129 min	98 min

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Variable	Abdominal burst (n = 15) (%)	Recurrent abdominal burst (n = 5) (%)
Hemorrhage		
<1000 mL	9 (60)	3 (60)
1000–3000 mL	6 (40)	2 (40)
>3000 mL	0 (0)	0 (0)
Mean	893 mL	1240 mL
Operator		
Resident/trainee	10 (66.7)	3 (60)
Specialist/supervisor	5 (33.3)	2 (40)
Thread to close fascia		
Monofilament	1 (8.3)	1 (20)
Multifilament	11 (91.7)	4 (80)
Technique used		
Basting	12 (100)	5 (100)
Interrupted	0 (0)	0 (0)
Operation type		
Hysterectomy	11 (73)	4 (80)
Cesarean section	3 (20)	1 (20)
Colostomy post-CS	1 (7)	0 (0)
Operation condition		
Elective	0 (0)	0 (0)
Emergency	15 (100)	5 (100)

Table 2: Characteristics of postoperative antibiotic administration before abdominal burst onset

Antibiotics	Case
Triple drugs combination (ceftriaxone, metronidazole, gentamicin)	5
Cefoperazone-sulbactam	3
Levofloxacin	1
Meropenem	2

Table 3: Characteristics of bacteria based on tissue and pus culture in recurrent abdominal burst cases

	Tissue culture	Pus culture
<i>Proteus mirabilis</i>	3	3
<i>Escherichia coli</i> ESBL (+)	2	2
<i>Pseudomonas aeruginosa</i>	1	0
<i>Enterobacter cloacae</i>	1	1
<i>Acinetobacter baumannii</i>	1	2
<i>Klebsiella pneumoniae</i> ESBL (+)	0	1
<i>Enterococcus faecalis</i>	0	1
<i>Burkholderia gladioli</i>	0	1

regenerating tissue. The same goes with hypoproteinemia and hypoalbuminemia, where amino acid in large number is needed in the tissue healing process.²

Of 15 cases, 7 patients were operated using Pfannenstiel incision (46.7%). This is different from the previous study done by Burger and Spiliotis, where midline incision has a bigger incidence rate than the transversal incision for abdominal burst. Midline incision cut the aponeurotic fiber, while transversal incision

cut between the fibers. In midline incision, contraction on the abdominal wall will give pressure and can induce a new wound on the lateral of the suture, while with the transversal incision, the sutures will be joined.^{7,8} Two-thirds of abdominal burst cases (66.7%) were done by the residents/trainees. Not to be forgotten that the skill of the operator and the technique used can also affect the outcome. Most of the obstetric abdominal burst cases happen after the hysterectomy post-cesarean section (73%). This condition is found in patients with post-cesarean section surgery, causing puerperal sepsis and making hysterectomy the only method to control infection.

One study by Amini et al., in 2013, in Pakistan, saying that abdominal burst prevalence is lower in emergency surgeries (14.89%) compared to elective surgeries (2.7%).⁹ The same condition was found in this case report, where the cases are all complications of obstetric elective surgeries with the meantime of operation is 129 minutes. Not to be forgotten that patients' condition needing emergency surgery are mainly not optimal and at a higher risk of contamination compared to elective surgery. In addition, the concert of the surgery may be affected that can lead to suboptimal closure of the abdomen at the ending of the procedure.⁶ In this study, majority of bleeding was <1000 mL, and the mean was 893 mL. Great number of bleeding in surgery and history of abdominal tampon usage is known to increase the risk of postoperative infection and sepsis.

Another important thing is that the strength of the wound stretch will increase to approximately 50% in week 4 post-operation. After 6 to 12 months, wound will achieve 80% of normal strength.¹⁰ In five cases of recurrent abdominal burst, only three patients were found with all-layer suture, while in two patients, the fascia was not stitched and was closed only using skin in the later abdominal burst. The outcome is similar to the other patients with layered sutures. The result is the opposite of the previously reported case, series when layered stitches and all-layer technique were compared the result shows the wound dehiscence is lower with the all-layer technique.³

All five patients that received hospital care underwent a repair surgery with retention sutures technique. Unfortunately, of five patients, four were reported to have recurrent abdominal burst 6 to 14 days after. Another patient passed away in day one of care after repair with retention suture. This is significant to the study by Gislason and Viste in 1999 that shows retention sutures do not prevent abdominal burst. In 48% of the cases where retention suture was used, abdominal burst was found, compared to 27% of patients without retention suture ($p = 0.31$). Retention suture also shows poor outcomes in cosmetics and a higher possibility of pain after surgery.¹¹

The suture used needs to have stable power in pulling for at least 6 weeks to allow the wound to have the normal resistance power.^{11,12} Majority of the thread used to close the fascia in patients is polyglactin 910 (Safil®) multifilament thread and mostly done with basting technique. Suture using multifilament thread can increase wound infection and incidence, therefore not recommended.

Besides incision and suture technique, wound infection prevention by using the aseptic technique can also prevent infection, as well as the use of prophylaxis antibiotics. Atraumatic surgery technique, good hemostasis, necrotic tissue debridement can reduce surgery area infection. Among 15 cases, surgery area infection was found in 93.3% of all cases. Infection in the surgery area causes wet necrotic tissue on the sutures and

Table 4: Recurrent abdominal burst patients post per abdominal obstetric operation in Dr Soetomo General Hospital (January 2013–June 2018)

Year	Identity	Diagnosis	Operation before burst	Incision type	Onset burst ¹	Management ¹	Onset burst ²	Management ²	Onset burst ³	Management ³	Postoperative infection	Outcome
2015	Mrs. W, 41 years	P1101 post-C-section + tubectomy (obesity class III + HSVB + PPROM) + ITP + chronic hypertension + subinvolution of uterus + wound dehiscence + DM type II	SC + tubectomy	Pfannenstiel	24 days	Primary suture (layer by layer)	16 days	Primary suture + retention suture	-	-	Yes	Died (Sepsis)
2015	Mrs. DS, 19 years	P2002 Post SC + tubectomy (fetal distress) + Ogilvie's Syndrome + Ileus postoperative + anemia aplastic + hypoalbuminemia + thrombocytopenia + febrils	SVH + aff abdominal tampon	Midline	9 days	Fascia: monofilament 1, baste Skin: silk 3-0, interrupted	14 days	Primary suture + retention suture	3 days	VAC	Yes	Good
2016	Mrs. R, 31 years	Puerperal sepsis + post-C-section (PPROM) + post-uterus stitch (internal bleeding) + puerperal sepsis + anemia + hypoalbuminemia + hypokalemia + increased ren-function	TAH + SOD	Midline	7 days	All layers	13 days	Fascia: not stitched Skin: Nylon Primary suture	-	-	Yes	Died, (Sepsis)
						All layers		Fascia: not stitched Skin: nylon				
						Fascia + skin: monofilament		Fascia: not stitched Skin: nylon				

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Year	Identity	Diagnosis	Operation before burst	Incision type	Onset burst ¹	Management ¹	Onset burst ²	Management ²	Onset burst ³	Management ³	Post-operative infection	Outcome
2016	Mrs. H, 33 years	Post-reopen (suspect internal bleeding) + post-SVH + adhesiolysis (Atonia Uteri + adhesion of appendix-rectosigmoid) + post-C-section (breech) + hypoalbuminemia + paralytic ileus + <i>uphill drain</i> + LRTI + ESBL (+)	SVH + hematoma evacuation	T-inverse	5 days	Primary suture + retention suture	6 days	Primary suture + retention suture	7 days	VAC modification	Yes	Good
2018	Mrs. S, 23 years	P3003 Post-C-section + sterilization (BSC 2x + in partu) + IDO + anemia + hypoalbuminemia + increased hemostasis + sepsis	SC + Tubectomy	T-Inverse	11 days	All layers Primary suture + retention suture, (layer by layer)	6 days	All layer Primary suture (layer by layer)	6 days, Burst, ⁴ 11 days	Primary suture	Yes	Good
						Fascia: Safil [®] , baste Skin: nylon, interrupted		Fascia: mono-filament, interrupted Skin: Nylon, interrupted		Fascia: not stitched Skin: Nylon, interrupted Wound care, compress kassa PZ/12 hours		

may separate the rectus sheath. It can also become the main risk factor of abdominal burst.¹³ Treatment for contaminated wounds must be done to identify the source of infection, e.g., intra-abdominal abscess or anastomosis leakage. Of all 5 recurrent abdominal burst cases, risk factors were found, either in postoperative or preoperative comorbidities, e.g., preterm premature rupture of membrane (PPROM), puerperal sepsis or autoimmune disease and steroid use. Colonies of the pathogen as an agent were found in all cases, around the wound and suture, mainly by *Acinetobacter* spp and *Escherichia coli* ESBL (+), which transmigrated from the gastrointestinal tract. Excessive use of cephalosporin and third-generation fluoroquinolone appears to increase the prevalence of ESBL. In most cases, prophylaxis antibiotic cefazolin 2 g was admitted intravenously 30 minutes before the surgery. Therapeutic antibiotic was also given after surgery based on culture. Therefore, as a consequence of selective pressure, postoperative peritonitis may be caused by multidrug bacteria, gram-negative bacteria and gram-positive, enterococci, and fungal infection in a bigger number.¹⁴ In three patients with a recurrent abdominal burst that happens more than twice, wound care using tissue culture and pus was done by the Clinical Microbiology Department. Antibiotic use is stopped when the sign of infection both clinically and laboratorially. Wound care without antibiotic using the aseptic concept shows a better outcome.

Wound care for recurrent abdominal burst patients in Dr Soetomo General Hospital requires a multidisciplinary team consisting of Departments of Obstetric & Gynecology, Plastic Surgery, Digestive, Clinical Microbiology, Internal Medicine, Cardiology, Pulmonology, Anesthesiology, Psychiatric, Neurology, and Nutrition. In the second case, a vacuum-assisted closure (VAC) technique is used, and the fourth case is done using the VAC technique modified by plastic surgery team. Patients were treated in an isolation room in order to maintain the aseptic wound care. Two large VAC mechanisms are intended to measure the speed of wound healing, by reducing excessive interstitial fluid and toxic inflammation mediators and micro deformation mechanism on the wound surface and the surrounding skin together to release growth factors, corresponding to the expansion of new tissue.¹⁵ Choosing the VAC technique is done based on each patient's wound problem. In the second case, wound problem is slough, infection, and massive exudates. This is the underlying reason of using VAC with vacuum machine pulled by continuous pressure, reducing the exudate production and reduced colonies of bacteria. The vacuum is continued intermittently in 4 hours time period. While for the fourth case, massive exudate is found without signs of infection. This is the underlying reason of using a modified VAC by the plastic surgery department of Dr Soetomo General Hospital, using two bottles as vacuum and drainage and infusion tube. This modified VAC works to suction the exudates and is used intermittently. Patient and the family were taught to vacuum every 4 hours (Figs 1 and 2).

Both patients underwent wound care using dressing, changed every 5 days, with a long time of care (70 and 136 days). Using the VAC, both machine and modified, the patients were allowed for room mobilization, adequate macronutrition, and micronutrition were also given to speed the healing process. Both patients were evaluated clinically and laboratorially, where the Hb was maintained above 12 g/dL and albumin above 3 g/dL. Both patients were then sent home with the modified VAC and were taught about home

care. The wound in both patients has closed after 34 and 38 days after the dismissal, without complication. This finding is similar to the previous study involving 207 patients in Korea, which stated that the right VAC is adequate dehiscence care to post laparotomy wound, with a low failure rate compared to conventional care, 0% and 14.3% ($p = 0.002$).¹⁶

Another patient was treated with conservative technique, using open abdomen care and gauze compress and normal saline. Conservative care is a choice for patients with disabilities and a poor general condition or at high risk of complications if re-surgery is done.¹⁷ Antibiotic was stopped, due to no sign of infection both clinically and laboratorially. The patient was treated using gauze compress, and normal saline changed every 12 hours and high protein nutrition during care. The treatment was shorter than using the other methods, only 48 days of care. The patient was then sent home and was taught about the aseptic wound care, and asked to come every 3 days to the Dr Soetomo General Hospital. The wound was fully healed 67 days after dismissal without complications (Fig. 3).

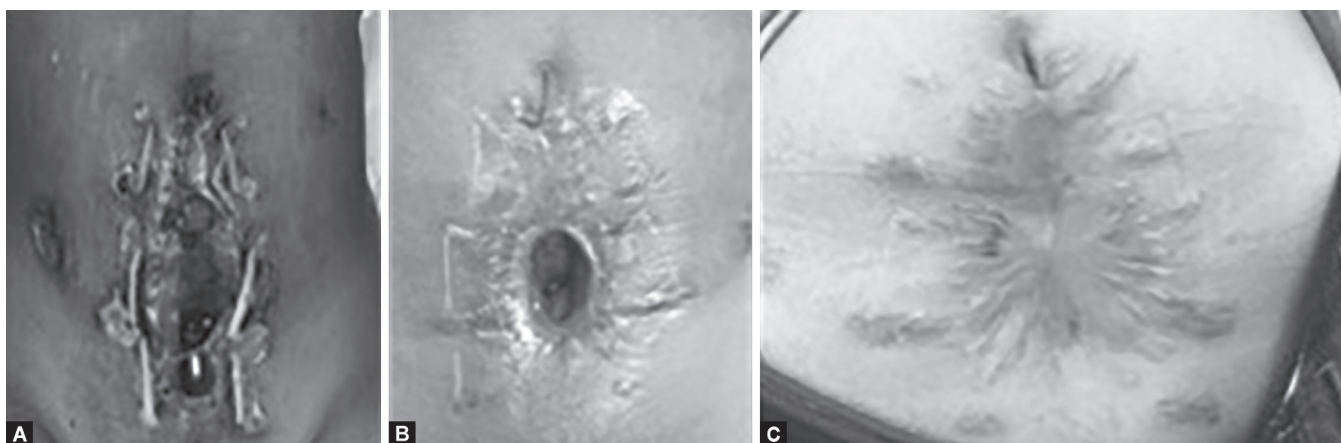
The mortality rate caused by abdominal burst is different in many studies. One study by Wolff stated that the mortality rate reaches 11%, while Hartzell and Winfield Hampton said 40%.¹⁸ In a study by Parmar et al., in 2008, the mortality rate is 10%.² In both death cases, recurrent abdominal burst and sepsis were found. Risk factors of puerperal sepsis before surgery increase the incidence of recurrent abdominal burst and worsen the sepsis.

The debate on how to prevent wound complications after primary surgeries has been going on for decades. A prevention strategy involving the facilities, environment, and experienced medical staffs to lower the morbidity and mortality in patients is needed. The infection factor as a wound closure failure predisposition is affected by epidemiological triad of a disease, e.g., host (patients' preoperative condition), agent (pathogenic bacteria), and the environment as a place that can influence the wound healing and bacterial growth. Paramedics, especially who are involved in the process of surgery, have to anticipate any complication. The standard of procedure must be done as instructed, and hand hygiene is also an important factor. Ideally, culture of microbe in the ward should be done annually, but it is still not yet implemented in Dr Soetomo General Hospital.

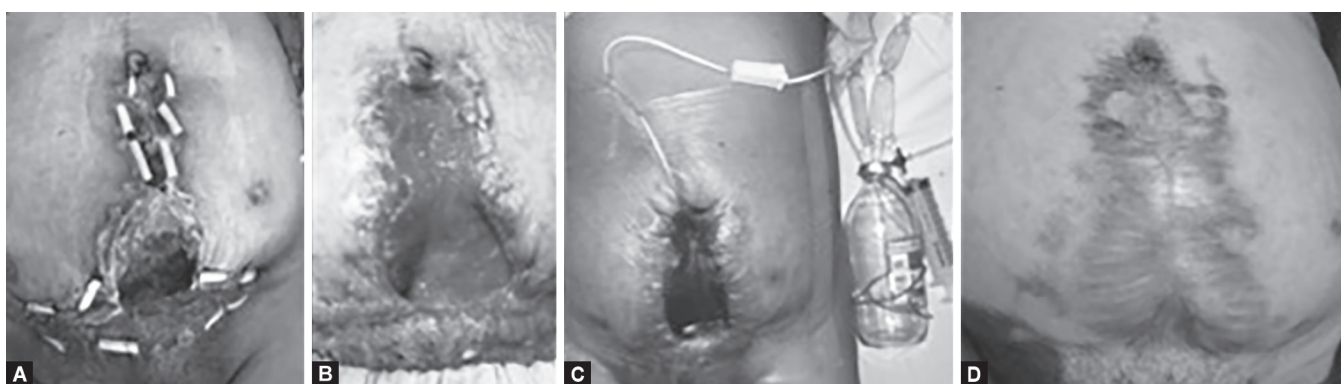
The limitations of this study are the incompleteness of the surgery report, and also the small size of the study sample. Therefore, we cannot compare significantly about the treatment of recurrent abdominal burst and the complications that happen because of each wound care methods. A bigger and long-term study is needed to examine some easy and effective wound care methods to lessen the treatment period and morbidity in recurrent abdominal burst cases.

CONCLUSION

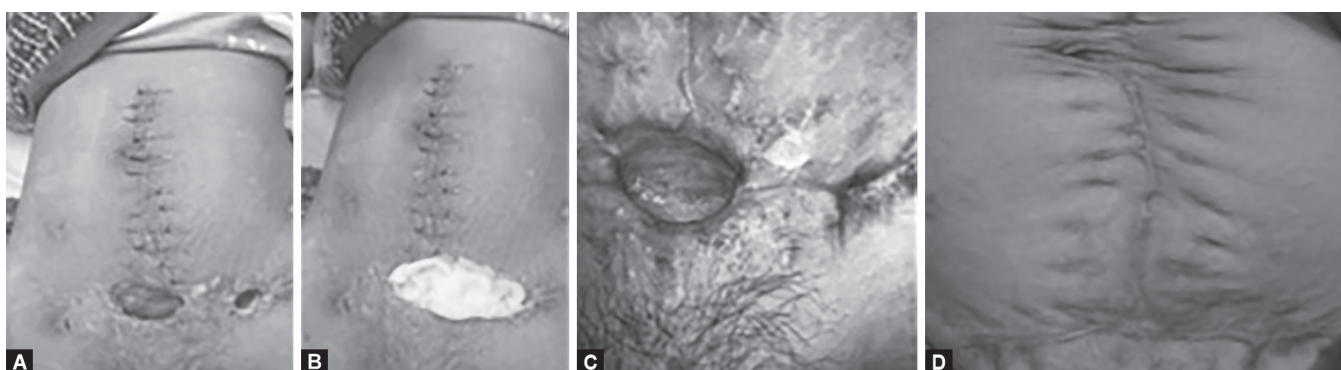
Complication of abdominal burst is 0.4% post per abdominal surgery in obstetric done in Dr Soetomo General Hospital from January 2013 until June 2018. Mortality rate is 6.7% of all obstetric abdominal burst cases, contributing as 0.02% in maternal mortality rate in Dr Soetomo General Hospital. Most preoperative risk factors were from the host, e.g., anemia, hypoalbuminemia, and predisposition diseases (for example obesity, diabetes mellitus, and autoimmune disease). Operative and postoperative risk factors were influenced by the type of incision, thread, suturing technique, type and condition of surgery, and postoperative care. The prevention



Figs 1A to C: Wound healing in the second case: (A) Day 45 of care after the third burst, before VAC; (B) Day 125 of care, after VAC for 75 days; (C) Wound closes after 38 days of home care



Figs 2A to D: Wound healing in the fourth case: (A) Day 26 of care after the third burst, before VAC; (B) Day 40 of care, with absorbent; (C) Day 42 of care, with modified VAC; (D) Wound closes after 34 days of home care



Figs 3A to D: Wound healing in the fifth case with conservative care: (A) Day 24 of care after the fourth burst; (B) Normal saline gauze compress care; (C) Day 48 of care, at dismissal; (D) Wound closed at 67 days after the dismissal

of infection in either before, during, or after surgery is crucial. It is also an important thing to do when giving the postoperative care inward, and preventing nosocomial agent transmission is an important thing to do. One-third of abdominal burst patients had recurrency, which caused a very long period of care, influencing their physical, mental, and social condition. Recurrent abdominal burst needs a multidisciplinary treatment, depending on the patient's wound problem. Two deaths were found in the recurrent abdominal burst cases, and both related to sepsis, while the other patients' wound has closed without any complications. A good

prevention strategy involving the facilities, environment, and experienced medical staffs to lower the morbidity and mortality in patients is needed.

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