

Autologous Blood Transfusion for Ectopic Pregnancy: A Simple Solution to a Complex Problem

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ABSTRACT

Background: Ruptured ectopic pregnancy can cause life threatening hemorrhagic shock in females. Allogenic blood transfusion is limited in resource-constrained settings but autologous blood is readily available. This study reports a case series of autologous blood transfusions performed between September and November 2004 in an emergency hospital run by Doctors Without Borders in Monrovia, Liberia in West Africa during a period of civil war in the country.

Methods: Out of a total 180 major surgery performed during that time, 16 were for ectopic pregnancy. After relevant history and examination, four quadrant aspiration of abdomen with 10 ml syringe was performed in suspected cases of ectopic pregnancy. Resistance free aspiration of blood in the syringe was taken as positive for intra-peritoneal hemorrhage and received immediate surgery. Blood was collected from the patient's abdominal cavity with a bowl, filtered through 9 layers of gauze, packed into ACD bottles and transfused intra-operatively.

Results: A minimum of 700 and maximum 2250 ml of blood was thus transfused. All patients survived the surgery with no operative or transfusion related complications and were discharged home within a few days.

Conclusion: Autologous blood transfusion is a safe, simple and economic alternative to allogenic blood transfusion for surgeries, like ectopic pregnancy, in resource limited setting.

KEYWORDS: autologous blood transfusion, ectopic pregnancy

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BACKGROUND

Ectopic pregnancy happens when a fertilized ova accidentally implants outside of the uterus, usually in the fallopian tubes. Its incidence is about 0.8% in Nepal and 1-2% globally.¹ A ruptured ectopic pregnancy can become life threatening and is considered a surgical emergency. It accounts for 4-10% of pregnancy related deaths in the US.² A study from Africa reports the case fatality rate of 1-3%³ in hospitals. The major cause of death is hemorrhagic shock. The newly implanted embryo that is rapidly growing and vascularizing has the

potential to lose quite a lot of blood. A quick and safe way of transfusing blood to the patient could thus be lifesaving.

The first well documented report of transfusion was in 1667 when blood was transfused from a sheep to an anemic boy in Paris. Although the boy survived, multiple other failed transfusions later, such procedures were banned. It was almost 150 years later that a young doctor, James Blundell, attempted the first human to human blood transfusion in London with some success.⁴ The idea of using a person's own blood for transfusion was developed around 1868. It was likely first performed in a hip exarticulation surgery where

¹ <https://www.nepjol.info/index.php/JCMC/article/view/41695/31685>

² https://journals.lww.com/clinicalobgyn/Abstract/2012/06000/Ectopic_Pregnancy__History,_Incidence,.3.aspx

³ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3751381/>
⁴ <https://library.oapen.org/bitstream/id/122ad698-d2d5-47de-a199-f9f18848eed6/9783839451632.pdf>

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the blood lost during the procedure was collected and transfused back by injecting into the femoral vein.⁵ Despite multiple other successful autologous blood transfusions (ABTs), the practice failed to gain much traction and fell into oblivion. Johannes Thies later reignited interest in ABT in 1914 when he performed the procedure in the case of a ruptured ectopic pregnancy.⁶

This article describes a case series of emergent intra-operative salvage autologous blood transfusions performed in cases of ectopic pregnancy by us in Liberia in 2004, almost a century after Thies, when the West African country was going through its worst years of civil war. The hospital, run by Doctors Without Borders (MSF), was located in the capital Monrovia but lacked many resources. It was similar in many aspects to rural hospitals in Nepal. One of the biggest limitations was the lack of a proper blood bank which severely limited our ability to safely operate. Ectopic pregnancy, in particular, presented a big challenge which was met by autologous blood transfusion. This technique is also perfectly doable in Nepal's rural and urban centers. We hope to convince the readers of the ease and safety of implementing it in their practices.

METHOD

The emergency hospital in Liberia was only treating major life-threatening surgical cases like trauma, complicated pregnancies and deliveries among others. During my 3 months from Sept to Nov 2004, we did 180 major surgeries out of which 16 were ruptured ectopic pregnancies (8.89%). By the time of presentation, most were in shock. The first step was to figure out the diagnosis and etiology of the shock. A working diagnosis of pregnancy was usually made quickly with appropriate history. Because of a lack of ultrasound, paramedical staff had been well trained to perform four quadrant aspiration with 20 bore needle in 10 ml syringe. Resistance free aspiration of blood from the abdomen was considered positive for hemoperitoneum. Signs of shock with a tender abdomen in reproductive age women with hemoperitoneum was considered to be ruptured ectopic pregnancy unless proven otherwise. Such patients were usually on the operating theatre within 15 minutes.

Abdomen was opened with midline infraumbilical incision under spinal anesthesia. Blood from abdominal cavity was collected with a smaller bowl. The blood was then passed through 9 layers of gauze for filtration to remove blood clots (figure 1), although most of the blood found was uncoagulated. This filtered blood was packed in acid citrate

dextrose (ACD) bottles (figure 2) and transfusion was started intra-operatively. It was thus possible to start blood transfusion within 10 minutes of the start of surgery. Ruptured tube was ligated, bleeding arrested. Abdomen closed with no drain after normal saline peritoneal wash. Patients were allowed fluids after 48 hours, although more recent evidence suggests early oral intake within 24 is preferable.⁷ Other standard post-operative management was followed and the patients usually returned home in 5-6 days.

RESULTS

Out of the 16 cases, 15 had ruptured fallopian tube (94%) and 1 (6%) had abdominal pregnancy with implantation on small bowel mesentery. Minimum blood transfused was 700 ml and maximum was 2250 ml while the average was 1628.13 ml. The average age of the patients was 28 years with a range from 21 to 43 (see table 1). There was zero morbidity or mortality of transfusion and all 16 patients were sent home in sound health. Autologous blood transfusion was thus deemed to be 100% safe and effective in this series.

DISCUSSION

This case series shows that intraoperative salvage autologous blood transfusion is quite easy to do (see method). It does not require any special training or experience and can be performed by anyone. This will be especially important in rural Nepal where blood transfusion is otherwise difficult. It can also be an important tool to use even in urban areas as blood is a scarce resource and Nepal faces critical shortage almost always.⁸ The most important appeal for ABT is perhaps the easy availability of autologous blood when it is most needed. Unlike allogenic blood transfusion, there is no need to wait for a blood typing or for it to be transported from the blood bank. Autologous blood transfusion had an extra appeal in Liberia during the early 2000s because of the HIV epidemic. With the prevalence of HIV at 2.5% in 2004 in the general population,⁹ getting a blood transfusion was risky. Anecdotal evidence suggested up to 25% prevalence in the hospitalized population. Giving one's own blood to oneself eliminated the risk of catching not only HIV but most other diseases. It has a similar appeal in Nepal where fear of catching an infection is often raised by patients. In a retrospective study from 1991 to 1996 at the Cleveland Clinic, only 5 out of 18506 intraoperatively salvaged autologous blood transfusion, i.e. 0.027% caused an adverse reaction.¹⁰ Compare this with the 1% seen with regular blood transfusions.¹¹ The most common reactions seen with ABT

⁵ <https://pubmed.ncbi.nlm.nih.gov/8867353/>

⁶ <https://jamanetwork.com/journals/jama/article-abstract/253357>

⁷ <https://pubmed.ncbi.nlm.nih.gov/30187634/>

⁸ <https://kathmandupost.com/health/2022/09/06/spike-in-dengue-cases-leads-to-acute-blood-shortages>

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<https://data.worldbank.org/indicator/SH.DYN.AIDS.ZS?locations=LR>

¹⁰ <https://pubmed.ncbi.nlm.nih.gov/9563411/>

¹¹ <https://www.sciencedirect.com/topics/medicine-and-dentistry/blood-transfusion-reaction#:~:text=Transfusion%20reactions%20may%20be%20seen,to%202.3%20million%20%5B1%5D.>

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were similar to allogenic transfusion and included febrile nonhemolytic and allergic reactions as well as an acute hemolytic reactions because of clerical error. Reactions to autologous blood transfusions should be handled like one would handle any other transfusion reaction. Contraindications to its use are bacterial infection or malignant cells in the operative field and use of microfibrillar collagen or other foreign material.¹² Electrolyte abnormalities and DIC are some risks to consider in massive transfusions.¹³ As the reader may have noted, we only performed ABT for ruptured ectopic pregnancies and not for other surgeries. This was mostly because hospital was providing very limited services. However, ABT can be useful in many other circumstances. It has been safely used to transfuse blood collected from chest tubes in hemothorax.¹⁴ A meta-analysis published in the *Annals of Surgery* identified intra-operative salvage ABT as safe during liver transplantation, even in patients with hepatocellular carcinoma.¹⁵ It is also effectively used in cardiac surgery.^{16,17} The feasibility of autologous blood transfusion in other emergency situations like trauma has been studied and written about by other researchers quite extensively. A literature review of such articles published in 2015 identified autologous blood transfusion as the only source of transfused blood in many circumstances.¹⁸ Perhaps the best use case of ABT is in elective surgeries where blood is collected from the patient pre-operatively. This has even been studied in randomized controlled trials with better surgical outcomes than with regular blood transfusions.^{19,20}

CONCLUSION

Autologous blood transfusion remains a safe and easy way of transfusing blood to patients in hemorrhagic shock in ectopic pregnancy. This readily available option with very minimal risks needs to be used more in Nepal in as many surgeries as possible. Given the ever-present critical shortage of blood in Nepal, the authors appeal the Department of Health, Nepal Medical Council, Nepal Red Cross and other relevant governing bodies to create autologous blood transfusion guidelines that can be easily implemented in rural hospitals. We also encourage medical colleges to train their students to be comfortable in this simple life saving technique.



Fig 1. Filtering blood through 9 layers of gauze to eliminate blood clots after collecting it from the intraperitoneal cavity



Fig 2. Packing blood in ACD bottles to make it ready for transfusion

Table 1. Record of patients with their respective amount of transfused blood

S.N.	Date	Patient Initials	Age	Blood transfused (ml)
1	29.09.2004	MC	32	1350
2	29.09.2004	KS	22	1350
3	30.09.2004	MF	25	900
4	01.10.2004	SG	21	1600
5	03.10.2004	EC	32	1850
6	05.10.2004	MK	24	1630
7	06.10.2004	LS	22	1600
8	06.10.2004	CK	31	1600
9	10.10.2004	JC	27	2050
10	10.10.2004	YY	28	2050
11	10.10.2004	PW	24	1600
12	12.10.2004	NP	43	700
13	14.10.2004	MK	26	1600
14	19.10.2004	HS	32	1870
15	20.10.2004	BB	22	2250
16	27.10.2004	MM	38	2250

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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1122708/>

<https://academic.oup.com/bjaed/article/6/5/192/337094>

¹⁴ <https://pubmed.ncbi.nlm.nih.gov/25807402/>

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https://journals.lww.com/annalsofsurgery/Fulltext/2022/08000/Safety_of_Intraoperative_Blood_Salvage_During.7.aspx

¹⁶ <https://pubmed.ncbi.nlm.nih.gov/31445910/>

¹⁷ [https://www.jtcvs.org/article/S0022-5223\(19\)41403-7/pdf](https://www.jtcvs.org/article/S0022-5223(19)41403-7/pdf)

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<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1122708/>

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