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Editorial | Preoperative embolization of intracranial meningioma with histoacryl through middle meningeal artery:  
The effect on intraoperative blood loss and complications related to the procedures. | Spontaneous thrombosis of non-tuberculous  
pulmonary artery mycotic pseudoaneurysm in prolonged childhood pneumonia | Foreign body (tooth) retrieval in polytrauma patient,  
using single use bronchoscopy and retrieval basket, a case report

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## **EDITORIAL**

On behalf of the editorial board of The Interventionalist Journal (TIJ), I would like to extend my deepest appreciation to the founder team, who had built the foundation of this journal.

The aim of The Interventionalist Journal is to provide and served as a platform for all clinicians who are doing minimally invasive procedures to share their findings, expertise, innovations and experiences at the regional and international significance. We envisaged being providing a high-standard and evidence-based platform for publishing high impact publications.

I am humbly inviting each of you to actively participate and contribute to The Interventionalist Journal as an author, reviewer, and reader.

The Interventionalist Journal has a strong starting point and I am confident that, we can eventually venture into new heights.

Sincerely,  
**Ezamin Abdul Rahim,**  
MD, MMed Rad  
Editor-in-Chief  
The Interventionalist Journal

## Table of Content

Preoperative embolization of Intracranial meningioma with Histoacryl through Middle meningeal artery: The effect on intraoperative blood loss and complications related to the procedures .....	1
<i>Seng Hong Koh, Khairul Azmi Abd Kadir, Fadhli Mohamed Sani.</i>	
Spontaneous thrombosis of non-tuberculous pulmonary artery mycotic pseudoaneurysm in prolonged childhood pneumonia .....	12
<i>Idris Ibrahim, Mohd Naim Mohd Yaakob, Mohd Hazeman Zakaria, Anas Tharek, Nurul Syazwani Rahmat, Mohd Naqib Mohd Sabri, Mohd Fandi Al-Khafiz Kamis.</i>	
Foreign body (tooth) retrieval in polytrauma patient, using single use bronchoscopy and retrieval basket, a case report .....	17
<i>Ummi Nadira Daut, Jamalul Azizi Abdul Rahaman, Wong Soo Fen, Mohd Hairol Mohamad Kasim.</i>	





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# PREOPERATIVE EMBOLIZATION OF INTRACRANIAL MENINGIOMA WITH HISTOACRYL THROUGH MIDDLE MENINGEAL ARTERY: THE EFFECT ON INTRAOPERATIVE BLOOD LOSS AND COMPLICATIONS RELATED TO THE PROCEDURES.

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## ABSTRACT

**Introduction:** This study aims to evaluate the effectiveness of preoperative embolization of intracranial meningioma using N-Butyl-2-Cyanoacrylate (Histoacryl) in reducing intraoperative blood loss and to assess the complications related to this procedure.

**Materials and methods:** This is a single-centered retrospective cross-sectional study of 106 patients with histologically proven meningioma underwent open surgical resection in University Malaya Medical Centre (UMMC) from 1<sup>st</sup> of January 2010 till 31<sup>st</sup> of May 2020. Out of the 106 samples, 29 of them underwent Histoacryl embolization prior to the surgery and 77 of them were subjected to surgery without preoperative embolization. The demographic data, mean comparison and correlation testing were performed using Statistical Package for the Social Sciences (SPSS).

**Result:** The majority of patients were female gender (68%). Most of the tumour were WHO grade 1 meningioma (86%). 48% of patients in the embolized group were transfused. Female gender had a longer duration of operation (280min vs 234min) and required higher amount of blood transfusion (1.3pint vs 0.6pint) compared to male gender ( $P < 0.05$ ). No statistical significance was found in the mean intraoperative blood loss, duration of operation and amount of blood transfused between the embolized and non-embolized group ( $P > 0.05$ ). No post-embolization complication encountered in our centre. The meningo-opthalmic branch is seen in 4% of our study population.

**Conclusion:** Preoperative embolization of meningioma is a safe procedure with careful patient selection. No significant difference is observed in the intraoperative blood loss, duration of operation and amount of blood transfused between the embolized and the non-embolized group. However, we find that female has a significant longer duration of operation and requires higher amount of blood transfusion.

**Keywords:** Preoperative embolization, Intracranial meningioma, Histoacryl, Meningo-opthalmic branch.

## INTRODUCTION

Preoperative embolization of meningioma is carried out as meningioma is a highly vascularized tumour with the aim to reduce intraoperative blood loss, reduce the need of blood transfusion and shorten the operative duration. Moreover, the

middle meningeal artery which is a common feeder of this tumour has an intraosseous course which imposes risk of uncontrolled bleeding intraoperatively during resection (1). The risks involved in meningioma embolization include those related to the angiography procedure

(contrast reaction, puncture site hematoma and vessel dissection) or more serious neurological complications (stroke, bleed and cranial nerve palsy due to injury of vasa nervorum). Other potential complications are scalp necrosis, permanent disability or death, which is very uncommon (2).

There is a wide range of embolic materials available in the market. Commonly used liquid embolic agent are N-butyl cyanoacrylate (Histoacryl) (3) and ethylene vinyl alcohol copolymer (Onyx) (4) while commonly used particulate embolic agents are polyvinyl alcohol (PVA) (5, 6) and tris-acryl gelatin microsphere (TAGM) (5, 7). The choice of embolic agent used is greatly depending on the operator preference and the anatomical consideration. Some studies show that liquid embolic material is more superior than particulate embolic material in preoperative embolization of meningioma as it simultaneously occludes the proximal and distal vessels. Therefore, the risk of intra-tumoral bleed from the collateral is lesser (8). It is also found that liquid embolic material reduces usage of contrast medium and when there is a single feeding vessel, it reduces the duration of embolization resulting in improved patient safety (9).

Histoacryl is a type of NBCA marketed by B. Braun©. This tissue adhesive embolic agent polymerizes immediately upon contact with tissue fluid. Kominami et al reported that NBCA performs better as it can be delivered with lower injection pressure and can be used with a wider range of microcatheters. Besides, it enters feeding vessels of meningioma simultaneously upon injection and prevents intratumoral bleed. When in use with lipiodol, it becomes radio-opaque and real time observation of movement of NCBA into dangerous anastomoses is made possible. The recognized disadvantage of NBCA is reflux into the normal cerebral artery due to its proximal occlusion of the feeding vessel (3). However, patient may still benefit from this proximal occlusion and the risk of hemorrhage is lesser compared with particulate embolic material (10). The purpose of this study is to evaluate the effectiveness of preoperative meningioma embolization using N-butyl cyanoacrylate (Histoacryl) in reducing intraoperative blood loss, to study the percentage of patient with ICA-ECA communication and to assess the complications related to the procedure at University Malaya

Medical Centre from year 2010 to 2020. This research is important and beneficial for us to study in depth about the safety profile of this embolic material and aid in counselling and management of meningioma patients in the future.

## **MATERIAL AND METHODS**

### **Study design**

This is a single center, retro-prospective study on the effectiveness of preoperative embolization of meningioma using Histoacryl via the middle meningeal artery in University Malaya Medical Centre (UMMC). The intraoperative blood loss in meningioma patient embolized with Histoacryl was compared with patients who underwent open surgical resection of meningioma without preoperative embolization. Ethical approval was secured from the institutional Medical Ethic Committee (MECID No: 20287-8965).

This study received no financial support or funding. Retrospective screening of histologically confirmed meningioma patients with matching criteria who was diagnosed between 1<sup>st</sup> January 2010 to 31<sup>st</sup> May 2020 in UMMC were retrieved using the Laboratory Information System (LIS). The other data parameters were then traced from the Hospital Information System (HIS) and the Radiology Information System (RIS).

### **Study subject**

The retrospective patient cohort was selected by reviewing all histopathology reports in UMMC from 1<sup>st</sup> January 2010 to 31<sup>st</sup> May 2020 and only patient with histologically proven meningioma will be selected. The histological findings and WHO grading of meningioma were traced from UMMC Laboratory Information System (LIS). The clinical data and operative notes of these patients were assessed via the UMMC Hospital Information System (HIS) portal. The imaging series, imaging findings, embolic agents used as well as complication during the procedure were gathered from UMMC Radiology Information System. (RIS).

Only cases with diagnosis of intracranial meningioma embolized with Histoacryl and complete clinical data were sampled. A total of 106 patients were found to be suitable to be recruited into the study. A total of 37 patients were excluded as there were incomplete clinical and operative details. Majority of those patients had no

documented intraoperative blood loss. 9 patients who were embolized with Polyvinyl alcohol (PVA) and/or microcoils were excluded from this study as well.

### **Inclusion criteria**

- All histologically proven intracranial meningioma patients from 1<sup>st</sup> of January 2010 until 31<sup>st</sup> of May 2020.

### **Exclusion criteria**

- Patient with intracranial meningioma embolized with non-Histoacryl embolic agent.
- Patient with incomplete clinical or operative data.

### **Data parameters and processing**

Microsoft Excel is utilized as data collection sheet. The data parameters include the followings:

- Medical Registration Number (MRN)
- Age
- Gender
- Tumour volume
- Presence of meningo-opthalmic anastomosis
- Embolic agent used
- Complication of embolization \*
- Intraoperative blood loss<sup>^</sup>
- Duration of operation
- Intraoperative and immediate post-operative packed cell transfusion #
- Histology Reporting date
- Histology grading of meningioma (WHO grading)

\*Complication of embolization is traced from the procedure note in RIS and follow up till the period of surgery from HIS. In our center, the open surgical resection is usually scheduled on the day after the meningioma embolization.

<sup>^</sup>Intraoperative blood loss is traced from the general anaesthesia note and represent a rough estimation by our trained anaesthetist.

# Amount of packed cell transfusion is traced from the general anaesthesia entry up to the period when patient was discharged from recovery bay to neuro ICU.

The data were then analyzed to review the patient demographic distribution and a series of statistical testing were performed using S.P.S.S.

software for Windows (Version 25.0, 2017, I.B.M. Corp, Armonk, NY).

### **Patient selection for meningioma embolization**

The patient selection for preoperative embolization of meningioma in our centre was made by the treating neurosurgeon on case-on-case basis. It was mainly depending on the clinical judgement of the referring surgeon.

### **Statistical analysis and data interpretation**

Data was subjected to normality check using using S.P.S.S. software for Windows (Version 25.0, 2017, I.B.M. Corp, Armonk, NY). Normality testing was performed using a Shapiro-Wilk test. In this study, Mann-Whitney U test was applied to compare differences between embolized and non-embolized groups of patients as the data was not normally distributed. Spearman correlation test was performed to analyse the correlations between my variables.

#### **Shapiro Wilk test**

- Check for normality of the variables.

#### **Mann-Whitney U test**

- To compare the mean difference between embolized and non-embolized groups with their intraoperative blood loss, OT time and amount of blood transfused.
- To compare the mean difference between gender with their intraoperative blood loss, OT time and amount of blood transfused.
- to compare the mean difference between patient embolized with Histoacryl and non-Histoacryl with their intraoperative blood loss, OT time and amount of blood transfused.

#### **Spearman correlation**

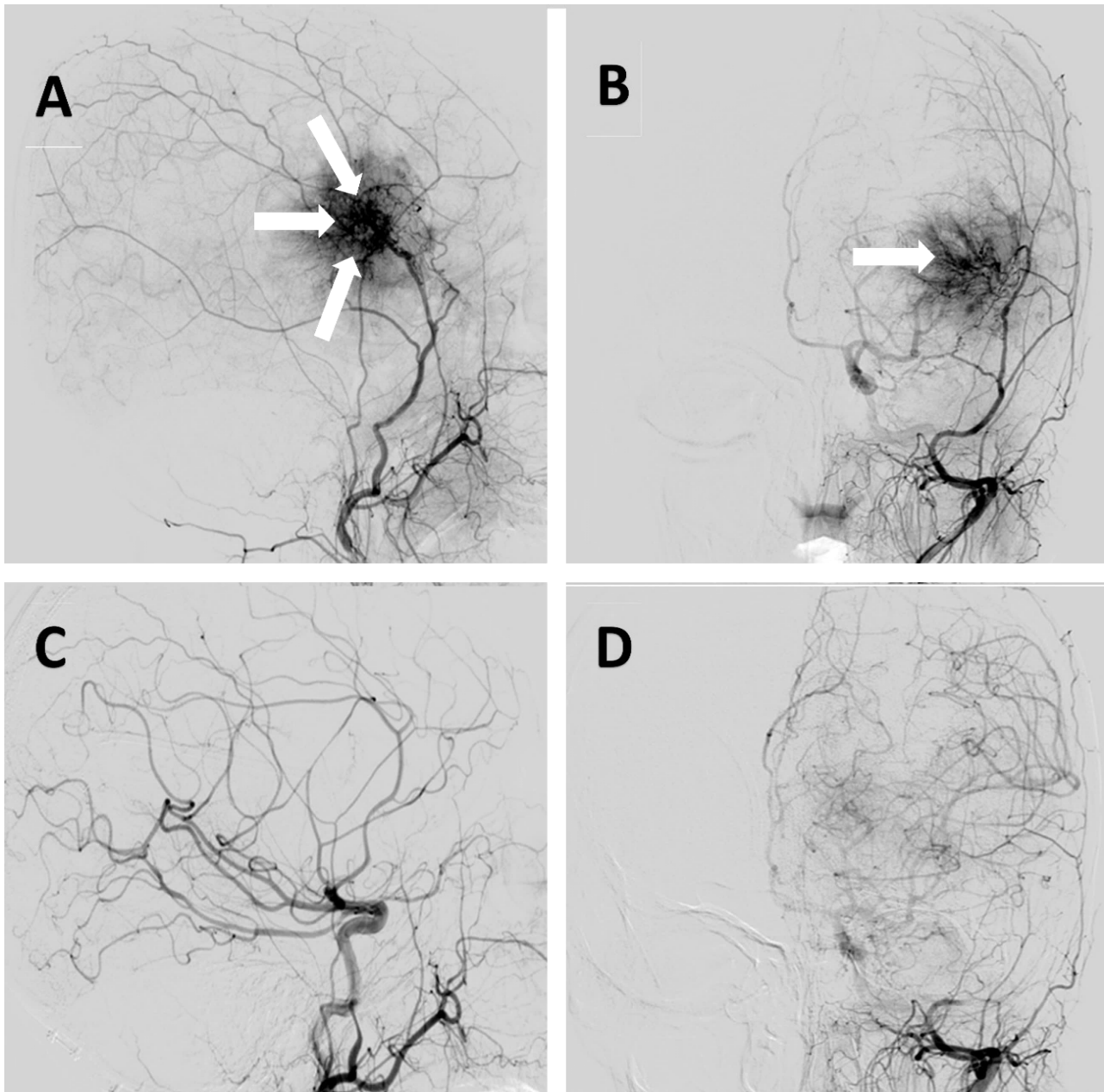
- To analyse the relationship between the dependent variables (intraoperative blood loss, OT time and amount of blood transfused).
- To analyse the relationship between age, tumour volume, intraoperative blood loss, OT time and amount of blood transfused.



### Steps in embolization of intracranial meningioma using Histoacryl in our centre.

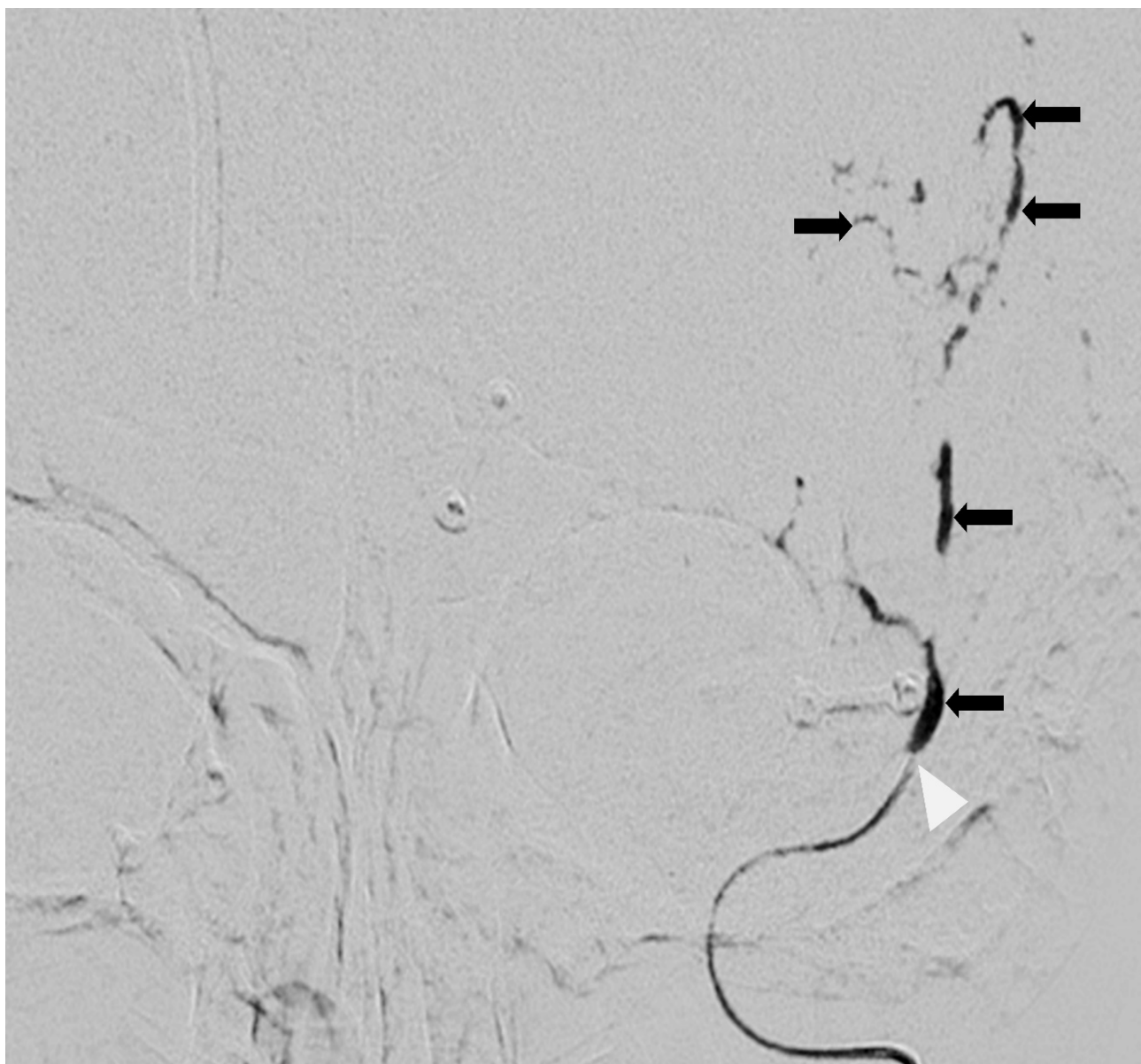
This procedure was done under aseptic technique with local anaesthesia coverage. Via the femoral approach, the femoral artery was punctured and a 6F arterial sheath was introduced. A 5F vertebral catheter was then advanced into the aortic arch followed by diagnostic angiography of the right and left internal carotid, external carotid and vertebral arteries. The meningioma blood supply was then identified. Possible ICA-ECA

anastomosis was evaluated. Selective catheterization of the middle meningeal artery was carried out under fluoroscopic guidance using microcatheter. Embolization of the intracranial meningioma was performed with premixed 0.5mls Histoacryl (25% concentration) and 1.5mls of lipiodol. Special care was given to prevent reflux of Histoacryl to the supplying main vessel. An immediate post embolization cerebral angiography was performed to assess the outcome of the embolization as well as the possible complication.



**Figure 1:** Preembolization cerebral angiogram of left external carotid artery in lateral view(Figure A) and AP view(Figure B) showing left parieto-temporal meningioma. Tumoural blush (white arrows) seen arising from the middle meningeal branch of the left external carotid artery. Post-embolization (Figure C and D) shows complete devascularization of the meningioma.





**Figure 2:** Embolization with Histoacryl through the left middle meningeal artery under fluoroscopic guidance (White arrowhead showing tip of microcatheter; Black arrows shows mixture of Histoacryl with Lipiodol).

## RESULTS

### Demographic distribution

#### Gender

	Embolized	Non-embolized	Total patient
Male	9	25	34
Female	20	52	72
	29	77	106

**Table 1:** Descriptive statistics on gender in embolized and non-embolized group

Female gender comprised the majority with a total number of 72 patients (67.9%). Out of the 72 female patient, 20 (27.8%) of them were embolized prior to open surgical excision whereas 52 of female patients were subjected to surgery without prior embolization. About half of the patients who were diagnosed with intracranial meningioma fell in the age group category of 51 to 70 years old, which comprised of 50.9% of total patient with the mean age of  $58.8 \pm 13.5$  years old. Most of the intracranial meningioma (n=74, 70%) had tumour volume less than 50mls. 85.7% of meningioma cases in the tumour volume category of >100mls

compared to 13.5% of meningioma cases in the tumour volume category of <50mls were embolized. The tumour volume distribution was comparable between the two groups with 61% (n=21) of male and 63% (n=46) of female fall in tumour volume category of <50mls. 26% (n=9) of male and 24% (n=18) of female fall in tumour volume category of 50-100mls. 11% (n=4) of male and 12% (n=9) of female fall in tumour volume category of >100mls. The mean of tumour volume in female is 44.1mls and 52.5mls in male. Majority of the intracranial meningioma were WHO grade 1 tumor which comprised of 86% of total cases.

	Embolized	Non-Embolized	Two- sided P value
Mean Blood Loss(ml)	627.5 $\pm$ 356.2	774.6 $\pm$ 595.1	0.39
Mean OT time(min)	240.5 $\pm$ 109.9	275.1 $\pm$ 132.1	0.22
Mean Blood TransufSION (pint)	1.1 $\pm$ 1.3	1.1 $\pm$ 1.6	0.58

\*statistical significance at  $P < 0.05$

**Table 2:** Mean comparison of intraoperative blood loss, duration of operation and amount of blood transfused in embolized (n=29) and non-embolized(n=77) group

	Male	Female	Two- sided P value
Mean Blood Loss(ml)	583.8 $\pm$ 295.3	805.6 $\pm$ 615.7	0.21
Mean OT time(min)	234.7 $\pm$ 141.1	280.2 $\pm$ 117.7	0.03*
Mean Blood TransufSION (pint)	0.6 $\pm$ 0.9	1.3 $\pm$ 1.7	0.02*

\*statistical significance at  $P < 0.05$

**Table 3:** Mean comparison of intraoperative blood loss, duration of operation and amount of blood transfused between male(n=34) and female(n=72) gender.

No significant difference between embolized and non-embolized group in intraoperative blood loss, operation duration and amount of blood transfused. The mean operation duration is longer (280min vs

235min) with greater amount of blood transfused (1.3pint vs 0.6pint) with P value of 0.03 and 0.02 respectively.

SPEARMAN CORRELATION COEFFICIENTS, N = 106				
		Duration of operation	Intraoperative blood loss	Amount of blood transfused
Duration of operation	Pearson correlation, r	-	0.41	0.39
	P value	-	<.0001*	<0.001*
Intraoperative blood loss	Pearson correlation, r	0.41	-	0.81
	P value	<0.001*		<0.001*
Amount of blood transfused	Pearson correlation, r	0.39	0.81	-
	P value	<0.001*	<0.001*	

\*Significant difference at  $P \leq 0.05$

**Table 4:** Correlations between duration of operation, blood loss and amount of blood transfused.

The duration of operation, intraoperative blood loss and amount of blood transfused were positively correlated and were statistically significant ( $p < 0.001$ ) with strong correlation seen between the intraoperative blood loss and amount of blood transfused ( $r = 0.81$ ).

SPEARMAN CORRELATION COEFFICIENTS, N = 29					
		Duration of operation	Intraoperative blood loss	Amount of blood transfused	Age
Age	Pearson correlation, r	-0.14	-0.16	-0.09	-
	P value	0.13	0.09	0.32	
Tumour volume	Pearson correlation, r	0.06	0.31	0.29	0.18
	P value	0.50	0.00009*	0.0021*	0.05

\*Significant difference at  $P \leq 0.05$

**Table 5:** Correlations between age, tumour volume, duration of operation, intraoperative blood loss and amount of blood transfused in patient embolized with Histoacryl.

Tumour volume had a weak positive correlation with intraoperative blood loss and amount of blood transfused ( $r = 0.31$  and  $r = 0.29$ ) in patient embolized with Histoacryl and they were statistically significant ( $p < 0.05$ ). Age had no correlation with tumour volume, intraoperative blood loss and amount of blood transfused.

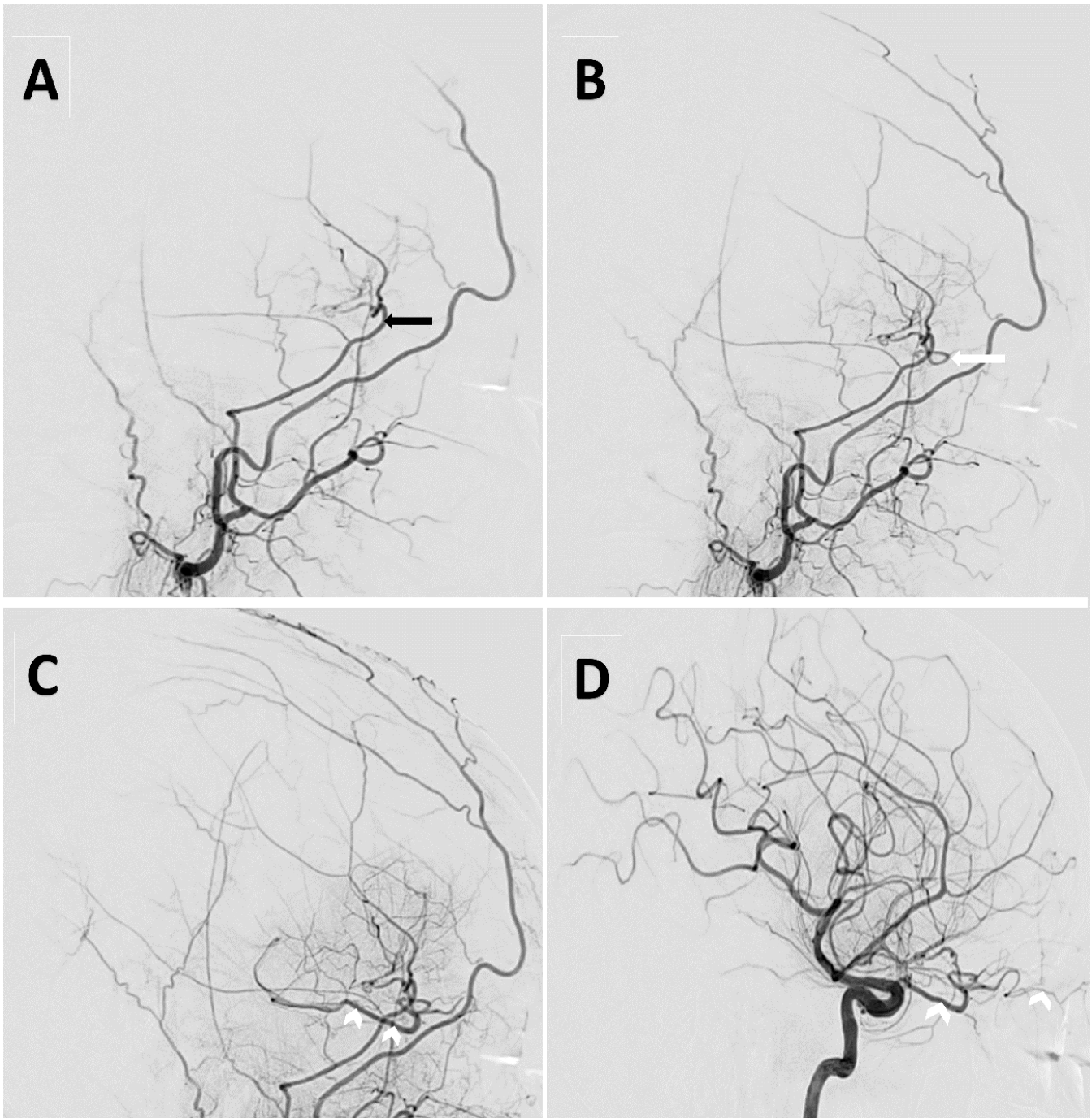
#### Complication of embolization.

There was no complication reported in all our patients during or post-procedural period when we

followed up our patient until the period, they went in for their open brain surgery.

#### Prevalence of meningo-ophthalmic anastomosis in patient diagnosed with meningioma.

There were in total 48 patients underwent cerebral angiogram examination in this study. Meningo-ophthalmic branch was found in 2 out of 48 patients which translated to 4% of patient.



**Figure 3:** Cerebral angiogram of left ECA run (Figure A, B and C) and left ICA run (Figure D) showing the meningo-opthalmic anastomosis. Black arrow in A pointing at the middle meningeal artery. White arrow in B pointing at the meningo-opthalmic anastomosis. White arrowheads in C and D showing the left ophthalmic artery.

## DISCUSSION

Preoperative embolization is a well-established adjuvant procedure in the management of intracranial meningioma. Out of the 106 cases that were sampled, only 27% of cases were embolized. The rate of embolization is lower compared to some studies carried out in other centers ranging from 37% to 44% (11, 12). The lower embolization

rate in our center is due to more stringent selection of patients in embolization. Only arterial feeders by middle meningeal artery from external carotid artery will be embolized in this centre as embolization of pial or dural feeders from internal carotid artery carries higher ischemic complications (10). Moreover, middle meningeal

artery which is a branch of maxillary artery of external carotid artery has an intraosseous course when it passes through foramen spinosum (1) and intraoperative manual compression of this artery is not possible if bleeding occurs.

Approximately 70% of intracranial meningioma cases have tumour volume of less than 50mls. Majority of the patients are female accounting for 68% of total study sample. About half of the cases (51%) fall in the age group of 51 to 70 years of age and as many as 86% of the cases are WHO grade 1 tumour. These findings are consistent with the studies done by other researchers (2, 10, 11).

Most of the intracranial meningioma in this study has tumour volume of less than 50mls. The percentage of embolized tumor is higher with increasing tumour volume. This can be explained by the tendency of neurosurgeon sending patients with larger tumour size for preoperative embolization aiming for devascularization of the tumour, an adjuvant therapy prior to surgical excision which is consistent with published paper by Dubel et al (2).

There are contradicting results in few studies done on preoperative embolization of meningioma. A study done by Dean et al shows there is significant reduction in intraoperative blood loss in the embolized group while Raper et al found that the intraoperative blood loss is significantly higher in the embolized group (11, 13). Bendszus et al reported that the mean intraoperative blood loss did not differ significantly and there is no significant difference between the two groups (14). In our study, the mean intraoperative blood loss in the embolized group is 19% lower than the non-embolized group (628mls vs 775mls), however it is not statistically significant ( $P>0.05$ ) which could be attributed by the limitation of small sample size.

No significant difference between embolized and non-embolized cases in regards with their mean operation duration or amount of blood transfused. These findings were similar with few published papers where they also found that no significant difference in the operation duration or amount of blood transfused between the embolized and non-embolized group (5, 11, 12).

In this study, there is significant difference in the mean operation duration between gender, with longer operation seen in females than in males (280 min vs 235 min) ( $P<0.05$ ). Besides, females

require higher amount of blood transfusion ( $P<0.05$ ). The distribution of tumour volume and rate of embolization are however comparable among females and males in this study. The mean tumour volume in male is higher than female (52.5ml vs 44.1mls). Thus, eliminating the possibility of larger tumour size or unequal distribution of patient receiving embolization in these two groups resulting in the difference in the operation duration and amount of blood needed. No explanation is found on any published paper to date. These findings need to be confirmed in a larger study. With this piece of information, counselling can be done more effectively with better preparation of blood product for female patients prior to surgery. Rajagopalan et al found that female is an independent risk factor for intraoperative blood loss (15). Although the mean intraoperative blood loss in female gender is higher compared to male in this study (806mls vs 584mls) but it is not statistically significant ( $P>0.05$ ). This may be due to the limitation of small sample study. In another study done by Raper et al, they found out that male has a mean intraoperative blood loss instead (11).

Strong correlation seen between the intraoperative blood loss and the amount of blood transfused ( $r=0.81$ ). Thus, reduction in intraoperative blood loss will result in reduction in amount of blood transfused reducing blood transfusion related complications. In addition, correlation between age, tumour volume and the dependent variables were analysed in patient embolized with Histoacryl undergone open surgical resection. Positive correlation found between tumour volume, intraoperative blood loss and amount of blood transfused and they are statistically significant ( $p<0.05$ ). Larger tumour volume results in higher intraoperative blood loss, thus needing larger amount of blood transfusion (16, 17). Age on the other hand has no correlation with tumour volume, intraoperative blood loss and amount of blood transfused.

Study of the vascular supply is done carefully during the pre-embolization cerebral angiogram to determine whether there is abnormal ICA-ECA anastomosis particularly the meningo-ophthalmic anastomosis as embolization of this vessel can cause blindness (2). It is found that only 4% of our study population has this abnormal communication and all of them were not embolized due to the risk stated above. This is higher than the



prevalence (1.4%) found in other centre reviewing the anatomical variant of ophthalmic artery in 1655 patients (18).

There is no reported complication in our patients post embolization. This is due to the measures taken only to embolized through the middle meningeal artery feeders and the usage of liquid embolic agent with proven safety profile. Special care is also taken by our neurointerventional radiologist not to embolize the middle meningeal artery when there is abnormal ICA-ECA anastomosis particularly the meningo-ophthalmic branch. Feeders from the ICA branches will not be embolized as the risk is higher and the benefit is limited (19). It was reported that the complication rate of preoperative embolization of intracranial embolization ranges from 0% to 8.3% (2). With all the measures taken, the complication rate for meningioma embolization is kept at 0%.

## CONCLUSION

Preoperative embolization of meningioma has been in practice for approximately 40 years. Our study has shown that there is no significant difference in the intraoperative blood loss, duration of operation and amount of blood transfused between the embolized and the non-embolized group using Histoacryl via the middle meningeal artery. Female has a significant longer duration of operation and requires higher amount of blood transfusion. Careful selection of patients and individual assessment should therefore be performed prior to subjecting patient for this procedure. It is important to note that this procedure is relatively safe with no complication encountered in our centre

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# SPONTANEOUS THROMBOSIS OF NON-TUBERCULOUS PULMONARY ARTERY MYCOTIC PSEUDOANEURYSM IN PROLONGED CHILDHOOD PNEUMONIA.

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## ABSTRACT

Pulmonary tuberculosis (PTB) is common in tropical country like Malaysia. Prolonged PTB infection may lead to mycotic pulmonary artery pseudoaneurysm (PAP). We report a case of childhood non-tuberculous pulmonary infection causing mycotic PAP which resolved spontaneously after antibiotics therapy.

A 1 year 6 months old girl underlying Down syndrome presented with prolonged fever for two weeks, cough and breathlessness. Her leucocytes count were elevated and she developed several hypotensive episodes secondary to septicaemia. Chest radiograph showed loculated right sided pleural effusion. Ultrasound revealed complex pleural collection and initial aspiration revealed a thick stale blood. Thinking of possible vascular cause, ultrasound able to locate a well-defined rounded structure with high flow velocity seen on Doppler ultrasound consistent with pseudoaneurysm and CT thorax confirmed the findings. Pulmonary artery angiogram prior to embolization revealed no evidence of abnormal vasculature or contrast blush at the region of interest. Complimentary ultrasound showed evidence of spontaneous thrombosis within the pseudoaneurysm.

Non-tuberculous PAP is a rare but possible life-threatening sequela of pneumonia. Pleural drainage in a haemothorax with concomitant mycotic thoracic pseudoaneurysm may cause loss of pressure tamponade and will end up with devastating consequences. Careful ultrasound image acquisition must be made by the attending radiologist prior to pleural drainage.

**Keywords:** Paediatric, Pulmonary artery pseudo-aneurysm, Pulmonary infection, Spontaneous thrombosis.

## INTRODUCTION

The incidence of pulmonary artery pseudo aneurysm (PAP) secondary to infective causes is a rare occurrence in modern medicine due to the easily assessable antibiotics treatment. However, in some cases with prolonged or partially treated chest infection, high bacterial load may cause invasion of the adjacent pulmonary vasculature causing weakening of the vessel wall thus make it

vulnerable to pseudoaneurysm formation. In tropical countries, the incidence of tuberculous mycotic pseudoaneurysm is common and is widely reported in the literature. We report a case of non-tuberculous PAP secondary to prolonged pneumonia in a paediatric patient which undergone spontaneous thrombosis.

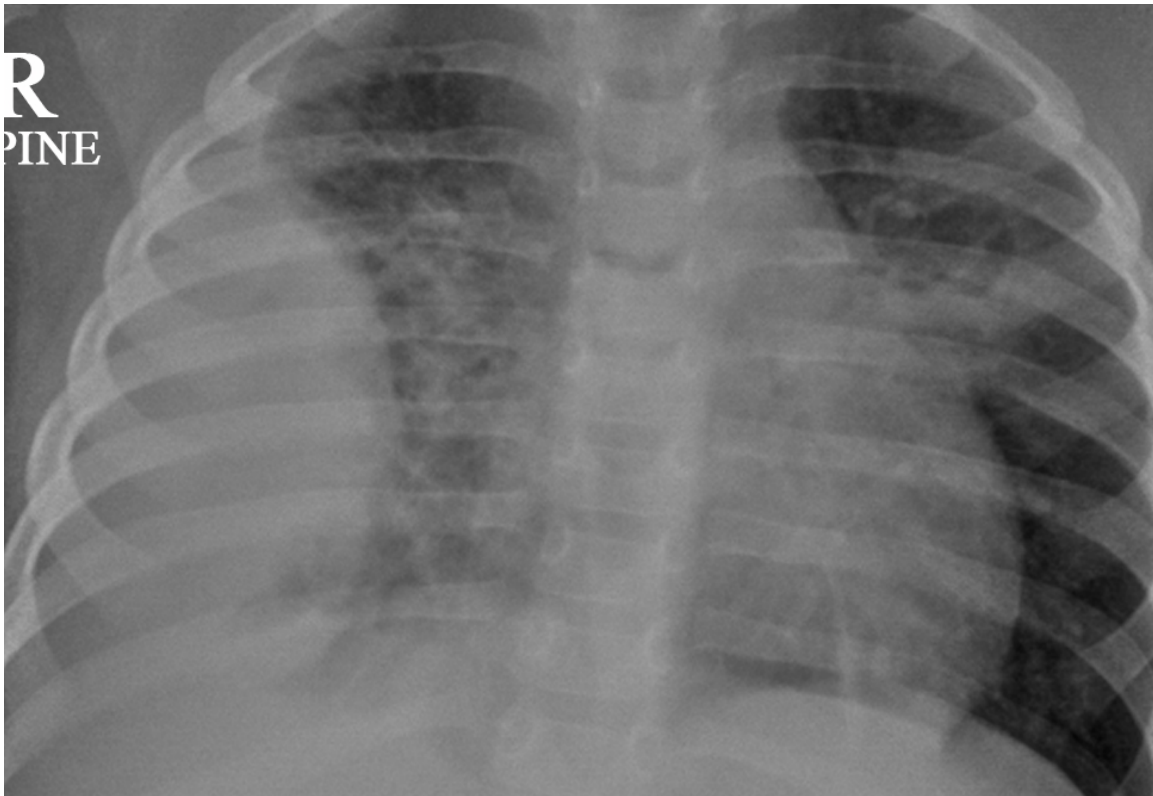
## CASE REPORT

A 1 year 6 months old girl with underlying Down syndrome, congenital hypothyroidism, small patent ductal arteriosus (PDA) and anorectal malformation presented on day 15 of illness with prolonged fever for two weeks and cough for 1 week. The fever started when she was previously admitted for stoma closure and pull through surgery for anorectal malformation. Initial chest x-ray showed infective changes and she was treated with intravenous Imipenem and Metronidazole for one week. The symptoms were resolving upon discharge, and she completed a one-week course of oral antibiotics at home. There were episodes of temperature spikes at home, which were well controlled by anti-pyretic medicines. However, her cough worsens, and she started to develop breathlessness which eventually made the parents brought her to the emergency department.

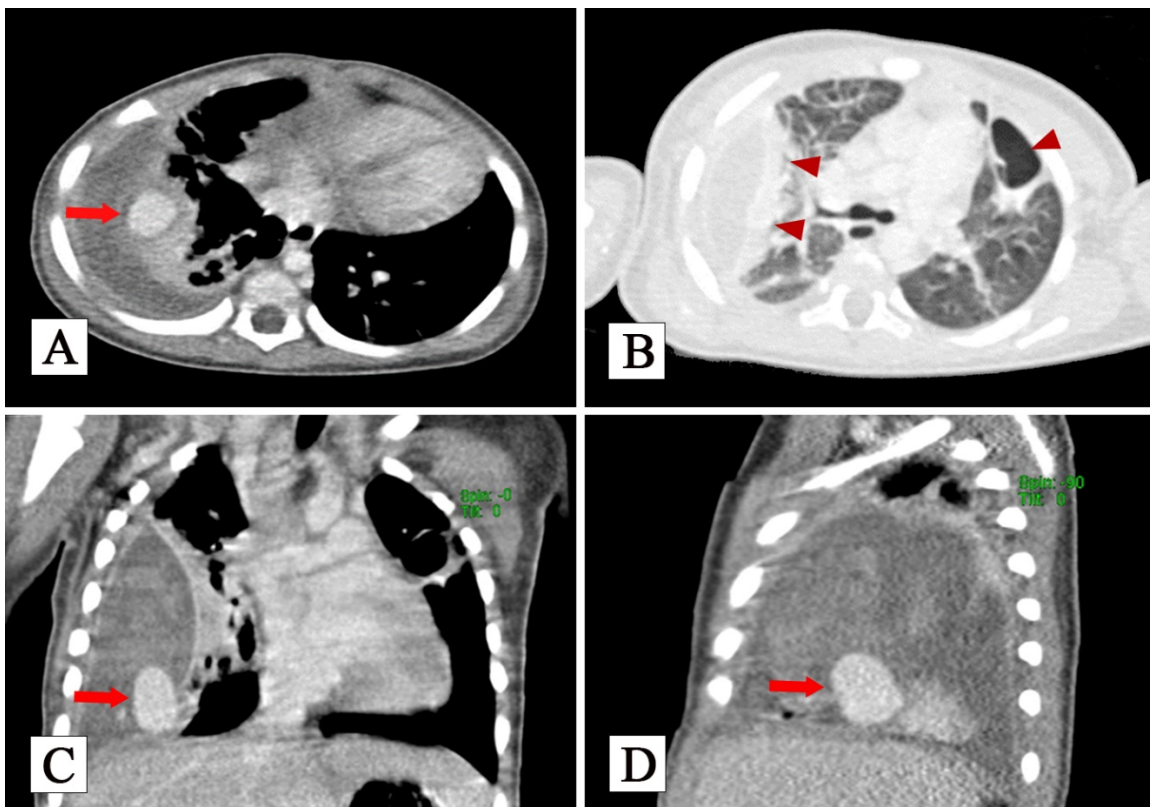
Upon arrival at the emergency department, she is tachypnoeic with reduced air entry on the right. Blood analysis reveals leukocytosis with neutrophil predominance /elevated white cell count which was  $21.7 \times 10^9/L$  which shows neutrophil predominance of 81.5 %. Chest x-ray shows large loculated right pleural effusion (Figure 1). Due to the ongoing respiratory distress, ultrasound guided drainage of the pleural effusion was carried out to alleviate the symptoms. Initial ultrasound showed complex septated collection with hyperchoic/echogenic internal debris. An 18G Chiba needle was used as puncture needle and the first aspiration revealed a thick stale bloody fluid. The needle was retracted and a further careful examination of the loculated effusion was carried out and a well-defined rounded structure with

internal high velocity flow Doppler signal resembling a pseudoaneurysm was found (Figure 4A). The previously noted hyperchoic/echogenic debris was actually blood products. An immediate contrasted CT thorax was done, and it confirms the diagnosis of pseudoaneurysm which was seen to arise from the descending branch of right pulmonary artery (Figure 2). There were also changes of active lung infection in the right lower lobe seen which includes cavitation, consolidation and ground glass lesions.

The child was subsequently admitted to the ICU due to worsening respiratory distress. Once her vitals were stable, a pulmonary artery angiogram was carried out with the intention to embolise the pseudoaneurysm. However, there was no contrast blush were found or evidence of pseudoaneurysm at the region of interest during angiogram. Complimentary ultrasound on the table showed presence of echo within the pseudoaneurysm with no Doppler flow signal detected suggestive of thrombosis (Figure 4B). In view of the patient's age and stable clinical parameters, repeated CT scan was not done to limit the radiation exposure. Two nasal swab cultures were done and came back positive for *Chryseobacterium indologenes* and *Elizabethkingia meningoseptica*. The sputum and blood cultures as well as tuberculosis screening were all negative. She completed multiple intravenous antibiotic and antifungal courses including Ceftriaxone, Gentamicin, Fluconazole and Metronidazole. The respiratory symptoms were finally subsided, and she was discharge home well.

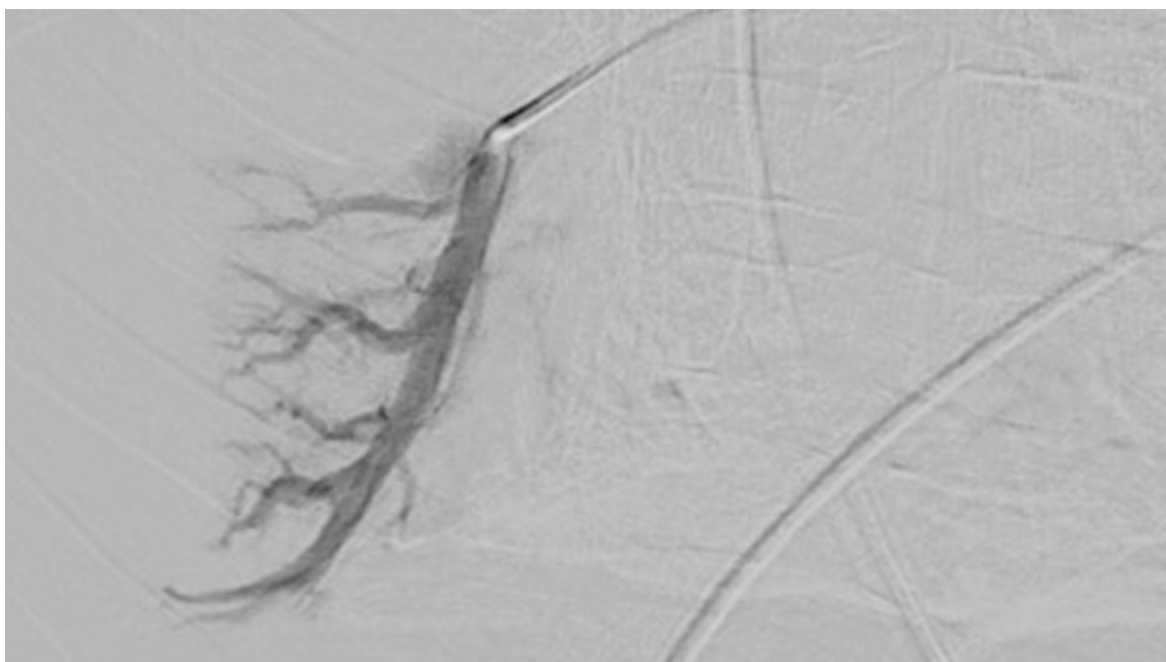


**Figure 1:** Initial chest x-ray upon presentation showed loculated right pleural effusion and infective lung changes.

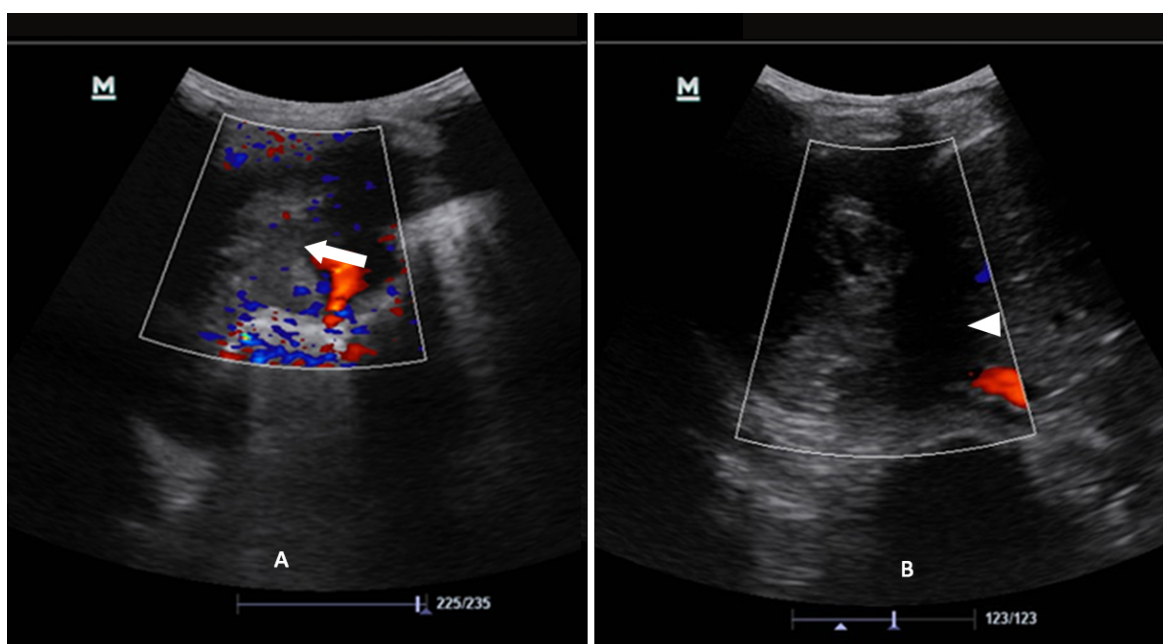


**Figure 2:** Contrast-enhanced CT thorax confirms presence of pseudoaneurysm arising from descending branch of right pulmonary artery (block arrow). Note the infective changes consists of consolidation, ground glass lesions and and cavitation.





**Figure3:** Selective Digital Subtraction Angiogram of the descending branch of pulmonary artery. Note there is no evidence of pseudoaneurysm or contrast extravasation.



**Figure 4A:** Initial ultrasound showed rounded hypoechoic structure with doppler flow in keeping with pseudoaneurysm (Blockarrow).

**Figure 5B:** On the table ultrasound during transcatheter angiogram noted spontaneous thrombosis within the previously seen pseudoaneurysm (Arrowhead).

## DISCUSSION

Pulmonary artery mycotic pseudoaneurysm (PAP) is one of the rare complications of prolonged childhood pneumonia. Pulmonary tuberculosis (TB) and syphilis were responsible for the majority of PAP with syphilis affecting the large pulmonary arteries and TB affecting smaller intraparenchymal vessels (1,2). In chronic pulmonary TB, the prevalence of pseudoaneurysm was reported to be around 4%, and often associated with significant mortality rate due to massive bleeding (3). Besides tuberculosis, several literatures reported cases of PAP secondary to bacterial and viral pneumonia. Bacterial cause of PAP was previously reported in a patient with ventilator-associated necrotizing pneumonia who developed life-threatening haemoptysis and was treated with coil embolization (4). There was also a case of PAP arising from H1N1 Influenza viral pneumonia which was successfully treated with coiling as well (5). In the paediatric age group, there is previous report of mycotic PAP as a sequela of necrotizing pneumonia in 6 months old infant who presented with haemoptysis. This case demonstrated that coil embolization is a good treatment of choice in paediatric population. Follow up CT scan months later showed complete resolution of the aneurysm (6).

The first line therapeutic options mentioned in most of the literature are minimally invasive procedure such as bronchoscopy coagulation and

embolization. Endovascular treatment was proven to be safe and effective to seal off the PAP (6,7). In cases of failed first line treatment, surgical ligation will be the next option. There is also previous case example of PAP secondary to trauma which recurs after surgical ligation and further treated with coil embolization (8). Although, most of the published cases of PAP are reported to be successfully managed by endovascular procedure or surgical resection, there is a slight chance of spontaneous resolution or thrombosis within the aneurysm. There is a reported case of Rasmussen's aneurysm which spontaneously resolved after nine months of anti-tuberculosis treatment (9).

## CONCLUSION

In conclusion, non-tuberculous PAP is a rare but possible life-threatening sequela of pneumonia. An effort must be made by Radiologist to screen for any abnormal Doppler signal within thoracic collection to exclude these rare complications especially prior to therapeutic interventional procedures as drainage of haemothorax secondary to PAP may lead to devastating consequences due to loss of pressure tamponade. Trans-catheter embolization may be considered as first line treatment regardless the age of the patient or clinical presentation. Occasionally, pseudoaneurysm may resolve by spontaneous thrombosis similar in this case study.

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# FOREIGN BODY (TOOTH) RETRIEVAL IN POLYTRAUMA PATIENT, USING SINGLE USE BRONCHOSCOPY AND RETRIEVAL BASKET, A CASE REPORT.

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## ABSTRACT

Foreign body aspiration can be a life-threatening emergency and it is uncommon entity in adults. For foreign body extraction, rigid bronchoscopy is superior to flexible bronchoscopy for operative manipulation. However, in view of maxillofacial trauma, rigid bronchoscopy is a risk for patient. Herein we describe our successful experience using single use flexible bronchoscopy with retrieval basket in removal of huge foreign body aspiration in a polytrauma patient.

**Keywords:** Foreign body, Endotracheal tube, Single use, Retrieve basket, Bronchoscopy.

## INTRODUCTION

Foreign body (FB) aspiration can be a life-threatening emergency and it is uncommon entity in adults. Serious complications such as granulation tissue formation, recurrent pneumonia, atelectasis and endobronchial stenotic scarring can occur in cases of delayed diagnosis and removal. (1)The use of flexible bronchoscopy for the extraction of airway foreign bodies in intubated patient has been hampered by the small calibre of the endotracheal tube (ETT). There are few reports comparing flexible and rigid bronchoscopy in adult foreign body aspiration. Previous study found rigid bronchoscopy was superior than flexible bronchoscopy in removal of FB in the airway.(2) However, in view of maxillofacial trauma, rigid bronchoscopy is a risk for patient. Little is known about the use of single use flexible bronchoscopy in the retrieval of foreign body in intubated patient. Herein we describe our successful experience using single use flexible bronchoscopy with retrieval

basket in removal of huge foreign body aspiration in a polytrauma, intubated patient.

## CASE REPORT

A 37-year-old man with underlying bipolar disorder, had a polytrauma following an impact full history of fall. He sustained fracture of the left lower limb, multiple facial soft tissue injury, fracture of facial bone, split palate and dental trauma. He also had orbital wall fracture, periorbital hematoma with subconjunctival haemorrhage. Patient was intubated for airway protection, using endotracheal tube size 7.5. Chest radiograph was performed and noted foreign body at the right bronchus (Figure A).

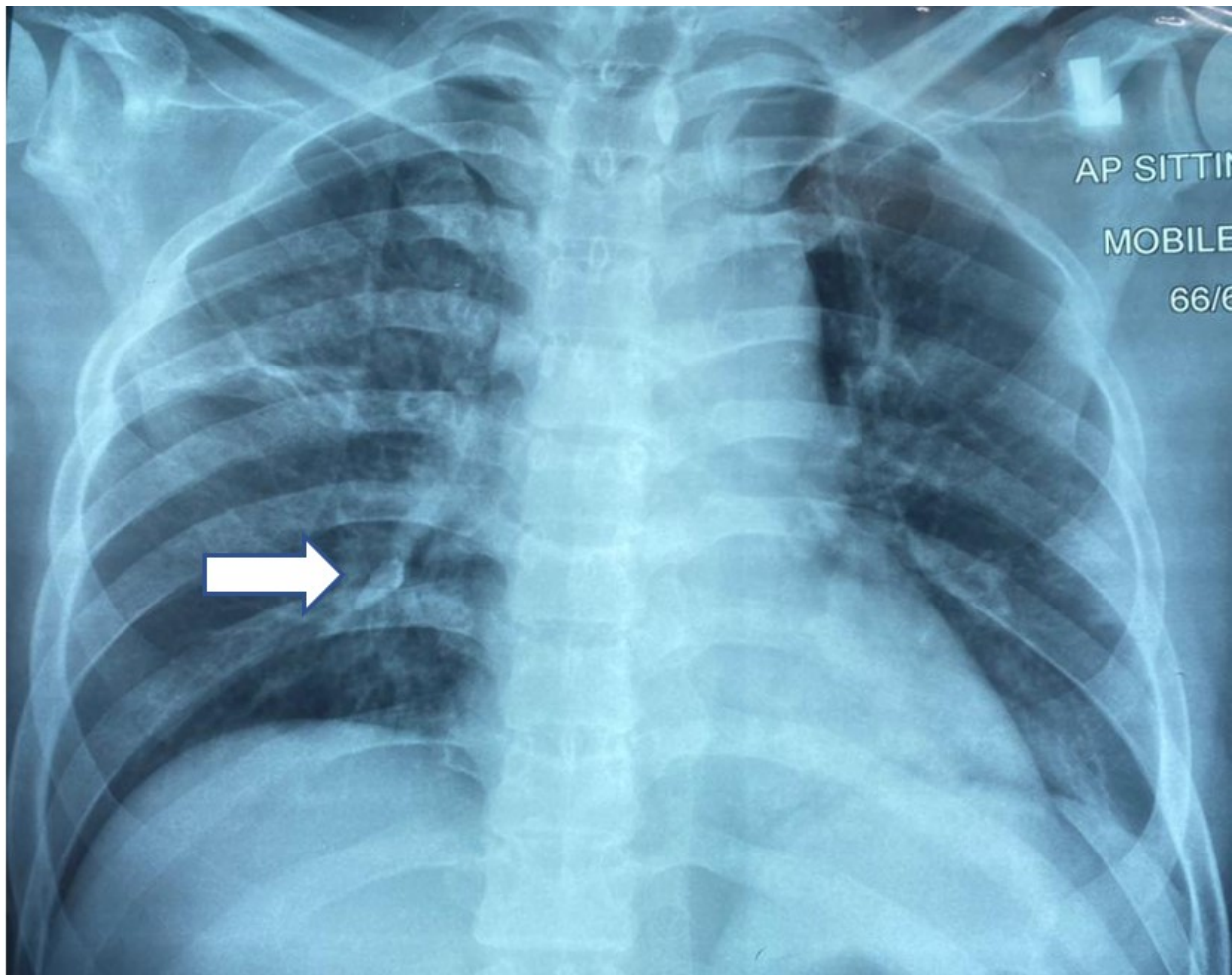
Urgent flexible bedside bronchoscopy was performed at ICU. The entire procedure took about 30 minutes. Bronchoscopy was done through the T tube which was connected to the ventilator tubing. The initial bronchoscopy was performed using flexible bronchoscopy with inner diameter of 2.0mm. We were able to visualize the aspirated

tooth; with 1 broken piece of the teeth at the right lower lobe segment(B10). We attempt to grasp with aligator forcep; size 1.8mm however not successful as it was smooth and hard surface. With the suction from the bronchoscopy, we are able to take out the small teeth piece leaving one solid tooth in the subsegment.

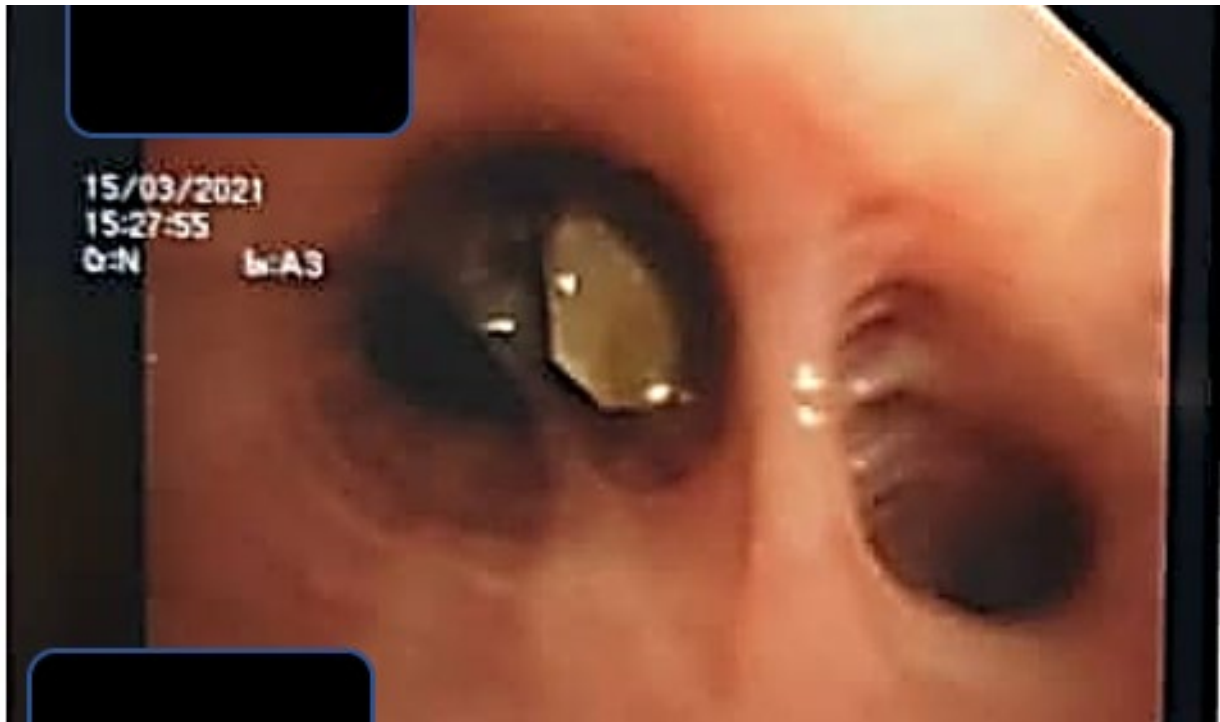
We decided to use our single use flexible bronchoscopy, with outer diameter of 5.2mm and with working channel size 2.8mm. We use retrieve basket 2.3mm and manage to pull out the tooth. There were few points where the ETT was

narrowed and causing total obstruction of the airway which was at the ETT tied and at the proximal end of ETT. This was managed by cutting the ETT ties and then we cut the proximal end of ETT. This patient had a difficult intubation in view of laryngeal edema therefore we have to keep the ETT in situ.

Patient had few episodes of desaturation for few second which make us to perform the manipulation quickly. Post procedure, patient was stable and no major complication.



**Figure A:** Chest radiograph show foreign body at the right lower zone



**Figure B:** Bronchoscopy finding; foreign body at right lower lobe segment (B10)



**Figure C:** Foreign body; tooth (30mmx10mm)



## DISCUSSION

This case was referred to us from other hospital. In our centre, rigid bronchoscopy was considered as the first-line modality for airway FB removal in patients who had a need for airway protection or impacted FB identified on chest imaging. However, in this case, the maxillofacial trauma did not permit us to proceed with rigid bronchoscopy. Therefore, we proceeded with urgent, bedside bronchoscopy in ICU.

There were many challenges that we faced. The flexible bronchoscopy that available has smaller working channel which not fit our therapeutic forceps. The single use bronchoscopy has shown its benefit. It was immediately available and can be set up in seconds. It was always sterile and improves patient safety. The larger working channel gives wide range of airway procedures. It is recommended for pulmonologist to have few of this bronchoscopy for emergency use. This is our first experienced using this single use bronchoscopy in foreign body retrieval.

For complicated case like this, the operator has to be an experienced pulmonologist. There

were few sides of obstruction during the procedure. The manipulation should be very careful to prevent form fall of the retrieved object but at the same time must be very fast in view of the obstruction of ETT causing the patient to be desaturated.

We extracted foreign bodies in the airway using retrieval baskets. The retrieval basket is uniquely designed for foreign body removal in the airway. It is composed of three or four strands to stably grasp objects. It is small enough to pass the channel and can unfold sufficiently to wrap around the objects in the airway. These properties may enable successful removal of foreign bodies and may also minimize accidental dislodgement.

## CONCLUSION

In conclusion, retrieval foreign body using single use bronchoscopy is safe, reliable, and effective instrument for extracting airway foreign bodies together with the retrieval basket in an urgent situation. We hope that more studies in the future can aid to bridge the current gaps in knowledge regarding single use bronchoscopy for more pulmonary intervention management.

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SPINE SIMULATOR

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