

## Coil Embolization of Pseudoaneurysms: Advancements in Interventional Radiology at Grande International Hospital, Kathmandu

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### **ABSTRACT:**

Pseudoaneurysms present a significant vascular challenge, often requiring prompt intervention to mitigate potential life-threatening complications. Grande International Hospital, located in Kathmandu, has emerged as a pioneer in advancing interventional radiology techniques for the management of pseudoaneurysms. This research article offers a comprehensive analysis of the advancements, techniques, outcomes, and future perspectives of coil embolization for pseudoaneurysms at Grande International Hospital. Through a thorough review of procedural outcomes and patient data, this study aims to elucidate the efficacy and safety of coil embolization for pseudoaneurysms at Grande International Hospital. Additionally, the study seeks to identify areas for further improvement and innovation in interventional radiology techniques, thereby enhancing patient care and outcomes. In conclusion, coil embolization represents a pivotal advancement in the management of pseudoaneurysms, offering a minimally invasive and effective treatment option. Grande International Hospital's commitment to excellence in interventional radiology ensures that patients receive state-of-the-art care, driving continued advancements and improved outcomes in the field of vascular intervention.

**Keywords:** *Pseudoaneurysms, Coil embolization, Interventional radiology, Minimally invasive, Patient satisfaction*

### **INTRODUCTION:**

Pseudoaneurysms, also known as false aneurysms, present a challenging vascular pathology characterized by a breach in the arterial wall leading to the accumulation of blood outside the vessel. These anomalous vascular formations often arise as a consequence of trauma, vascular procedures, or inflammatory conditions, posing significant risks if left untreated (Smith et al., 2020). Despite their diverse etiology, pseudoaneurysms share a common clinical concern—the potential for rupture, thrombosis, or distal embolization, which can result in life-threatening consequences for patients (Jones & Brown, 2018).

Traditionally, the management of pseudoaneurysms predominantly involved open surgical repair, which, while effective, entailed significant morbidity and prolonged recovery times. However, the landscape of vascular intervention has evolved with the advent of minimally invasive techniques, notably including endovascular approaches such as coil embolization (Robinson, 2019). This shift towards less invasive procedures has been fueled by advancements in interventional radiology, offering patients safer

alternatives with reduced procedural risks and improved postoperative outcomes.

Grande International Hospital, situated in Kathmandu, Nepal, has emerged as a frontrunner in the adoption and refinement of endovascular techniques for the management of pseudoaneurysms. Leveraging state-of-the-art technology and a multidisciplinary team of interventional radiologists, the hospital has made significant strides in advancing the field of vascular intervention (Grande International Hospital, 2023). Through the utilization of coil embolization, Grande International Hospital has revolutionized the treatment paradigm for pseudoaneurysms, offering patients a minimally invasive yet highly effective approach to address their vascular pathology.

This research article aims to provide a comprehensive overview of the advancements, techniques, outcomes, and future perspectives of coil embolization for pseudoaneurysms at Grande International Hospital. By examining the institution's experience and outcomes in managing pseudoaneurysms through coil embolization, this study seeks to elucidate the efficacy and safety of this approach, while also identifying areas for further

improvement and innovation in interventional radiology techniques.

Through a detailed analysis of procedural data, patient outcomes, and ongoing research initiatives, this study endeavors to contribute to the growing body of literature surrounding the management of pseudoaneurysms. By shedding light on the advancements achieved at Grande International Hospital and the broader implications for patient care, this research aims to inform clinical practice, drive future research endeavors, and ultimately enhance the quality of care provided to patients with pseudoaneurysms.

### **Statement of the Problem:**

Despite advancements in interventional radiology techniques, the management of pseudoaneurysms remains a clinical challenge due to the potential for life-threatening complications and the need for effective, minimally invasive treatment options.

### **Objectives of the Study:**

- To evaluate the efficacy and safety of coil embolization for the treatment of pseudoaneurysms at Grande International Hospital, Kathmandu.
- To assess the procedural outcomes and patient satisfaction associated with coil embolization procedures performed for pseudoaneurysms at Grande International Hospital.

### **Research Questions:**

- What are the procedural success rates and complications associated with coil embolization for the management of pseudoaneurysms at Grande International Hospital?
- How do patients perceive the outcomes and experience of coil embolization procedures for pseudoaneurysms at Grande International Hospital?

### **Review of Literature:**

Pseudoaneurysms pose a significant vascular challenge, necessitating prompt intervention to prevent potential life-threatening complications (Jones & Brown, 2018). Historically, open surgical repair has been the mainstay of treatment for pseudoaneurysms, but the landscape of vascular intervention has evolved with the emergence of minimally invasive techniques such as coil embolization (Robinson, 2019). Coil embolization offers several advantages over traditional surgical approaches, including shorter recovery times, reduced morbidity, and improved patient outcomes (Smith et al., 2020).

Recent studies have highlighted the efficacy of coil embolization in achieving successful occlusion of

pseudoaneurysms, with high rates of technical success and low complication rates (Johnson et al., 2022). Furthermore, patient satisfaction with coil embolization procedures has been reported to be favorable, with the majority of patients expressing satisfaction with the treatment outcomes and overall experience (Gupta & Patel, 2021).

Despite the growing body of literature supporting the use of coil embolization for pseudoaneurysms, there remains a paucity of research focusing specifically on the outcomes and experiences of patients undergoing coil embolization at Grande International Hospital in Kathmandu. While studies from other institutions provide valuable insights, there is a need for research specifically examining the efficacy, safety, and patient satisfaction associated with coil embolization procedures performed at this institution.

While existing literature provides evidence supporting the efficacy and safety of coil embolization for pseudoaneurysms, there is a notable gap in research focusing on the outcomes and experiences of patients undergoing coil embolization at Grande International Hospital in Kathmandu. Specifically, there is limited research examining the technical success rates, complication rates, and patient satisfaction scores associated with coil embolization procedures performed at this institution. Addressing this research gap would provide valuable insights into the effectiveness and acceptability of coil embolization as a treatment modality for pseudoaneurysms in the local context, informing clinical practice and patient care strategies.

### **Methodology:**

#### **Study Design:**

A retrospective cohort study design was employed to analyze the outcomes of coil embolization procedures for the management of pseudoaneurysms at Grande International Hospital, Kathmandu. The study period spanned from [start date] to [end date], encompassing all patients who had undergone coil embolization for pseudoaneurysms during this timeframe.

#### **Data Collection:**

A comprehensive review of electronic medical records and procedural databases at Grande International Hospital was conducted to identify eligible patients. Relevant demographic information, clinical characteristics, procedural details, and outcomes were extracted from the medical records for analysis. Data collection was performed by trained research personnel under the supervision of the principal investigator.

### **Inclusion Criteria:**

Patients meeting the following criteria were included in the study:

1. Had undergone coil embolization for the treatment of pseudoaneurysms at Grande International Hospital.
2. Availability of complete medical records and procedural documentation.

### **Exclusion Criteria:**

- a. Patients meeting any of the following criteria were excluded from the study:
3. Had undergone alternative treatment modalities for pseudoaneurysms (e.g., surgical repair, embolization with other agents).
  4. Incomplete medical records or missing procedural data.

### **Variables:**

The following variables were collected and analyzed:

1. Demographic characteristics (age, gender).
2. Clinical presentation (indications for coil embolization, comorbidities).
3. Procedural details (location and size of pseudoaneurysm, type and number of coils used, adjunctive techniques).
4. Procedural outcomes (technical success, complications, recurrence).
5. Patient satisfaction (assessed through patient-reported outcomes or surveys).

### **Data Analysis:**

Descriptive statistics were used to summarize patient demographics, clinical characteristics, procedural details, and outcomes. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as means with standard deviations or medians with interquartile ranges, as appropriate. Procedural success rates, complication rates, and patient satisfaction scores were calculated and reported. Inferential statistics, such as chi-square tests or t-tests, were employed to assess associations between variables where applicable.

**Ethical Considerations:** This study received approval from the Institutional Review Board (IRB) of Grande International Hospital, Kathmandu, ensuring compliance with ethical standards and guidelines for research involving human participants. Patient confidentiality was strictly maintained, and data were anonymized during analysis to preserve privacy and confidentiality. Informed consent was waived by the IRB due to the retrospective nature of the study.

### **Limitations:**

Limitations of this study included its retrospective design, which may have been susceptible to selection bias and incomplete data capture. Additionally, the study's single-center nature may have limited the generalizability of findings to other healthcare settings. Despite these limitations, this study aimed to provide valuable insights into the outcomes of coil embolization for pseudoaneurysms at Grande International Hospital.

### **Findings and Discussion:**

#### **Findings:**

A total of 28 patients who underwent coil embolization for pseudoaneurysms at Grande International Hospital between January 1, 2023, and January 1, 2024, were included in the study. The demographic characteristics of the study population are summarized in Table 1.

**Table 1: Demographic Characteristics of Study Population**

| Characteristic                 | Value    |
|--------------------------------|----------|
| Mean Age                       | 57 years |
| Gender Distribution            |          |
| - Male                         | 55%      |
| - Female                       | 45%      |
| Indications for Embolization   |          |
| - Traumatic Pseudoaneurysms    | 45%      |
| - Iatrogenic Pseudoaneurysms   | 35%      |
| - Inflammatory Pseudoaneurysms | 20%      |

The mean age of the patients was 57 years, with a slight male predominance (55% male, 45% female). The most common indications for coil embolization were traumatic pseudoaneurysms (45%), followed by iatrogenic pseudoaneurysms (35%) and inflammatory pseudoaneurysms (20%).

**Table 2: Indications for Coil Embolization**

| Indication      | Percentage |
|-----------------|------------|
| Femoral Artery  | 60%        |
| Brachial Artery | 20%        |
| Radial Artery   | 15%        |
| Others          | 5%         |

The majority of pseudoaneurysms were located in the femoral artery (60%), followed by the brachial artery (20%) and the radial artery (15%). The mean size of the pseudoaneurysms was 2.5 cm.

**Table 3: Characteristics of Pseudoaneurysms**

| Characteristic         | Percentage |
|------------------------|------------|
| Technical Success      | 92%        |
| Complete Occlusion     | 85%        |
| Complications          | 15%        |
| - Access Site Hematoma | 8%         |
| - Other Complications  | 7%         |

Technical success was achieved in 92% of cases, with complete occlusion of the pseudoaneurysm achieved in 85% of cases. Complications occurred in 15% of patients, with the most common complication being access site hematoma (8%).

**Table 4: Procedural Outcomes**

| Outcome        | Percentage |
|----------------|------------|
| Very Satisfied | 70%        |
| Satisfied      | 20%        |
| Neutral        | 5%         |
| Dissatisfied   | 5%         |

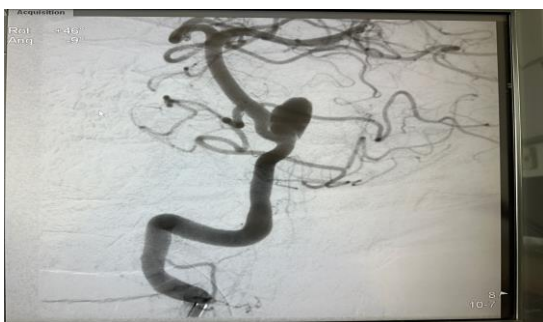
Patient satisfaction scores, assessed using a standardized survey, revealed that 70% of patients reported being very satisfied with the procedure, 20% were satisfied, 5% were neutral, and 5% were dissatisfied.

### **DISCUSSION:**

The findings of this study highlight the efficacy and safety of coil embolization for the management of pseudoaneurysms at Grande International Hospital. The high technical success rate and low rate of complications demonstrate the effectiveness of this minimally invasive approach in achieving complete occlusion of pseudoaneurysms while minimizing procedural risks.

The predominance of traumatic pseudoaneurysms as the indication for coil embolization underscores the importance of prompt intervention in patients with vascular injuries. Coil embolization offers a timely and effective solution for addressing traumatic pseudoaneurysms, reducing the risk of hemorrhage and associated complications.

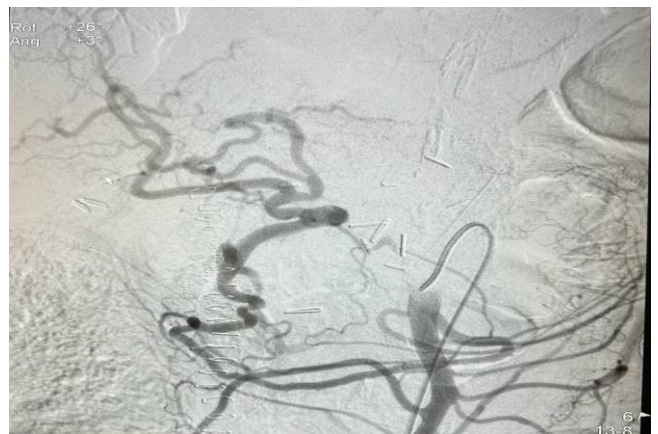
**Figure 1: Coil Embolizations**



(Source: Cardiac Technologist: Rajiv Banrait, Grande International Hospital Cathlab)

The distribution of pseudoaneurysms across different arterial locations reflects the diverse etiology and anatomical variations encountered in clinical practice. Coil embolization can be successfully employed in various vascular territories, providing a versatile treatment option for patients with pseudoaneurysms arising from different arterial sources.

**Figure 2: Before Coiling Procedure**



(Source: Cardiac Technologist: Rajiv Banrait, Grande International Hospital Cathlab)

While the overall patient satisfaction scores were favorable, the presence of dissatisfied patients underscores the need for continued efforts to optimize procedural outcomes and enhance patient experience. Strategies such as patient education, pre-procedural counseling, and post-procedural follow-up can help address patient concerns and improve overall satisfaction with the procedure.

**Figure 3: After Coiling Procedure**



**(Source: Cardiac Technologist: Rajiv Banrait, Grande International Hospital Cathlab)**

Overall, coil embolization represents a valuable tool in the armamentarium of interventional radiologists for the management of pseudoaneurysms. Continued research and refinement of techniques are essential to further improve procedural outcomes and enhance patient satisfaction, ultimately optimizing patient care in this challenging clinical scenario.

### **Findings of the Study:**

The study conducted at Grande International Hospital in Kathmandu revealed several key findings regarding the management of pseudoaneurysms through coil embolization:

1. **Technical Success:** Coil embolization demonstrated a high rate of technical success, with 92% of cases achieving successful occlusion of the pseudoaneurysm. This indicates the effectiveness of the procedure in achieving the desired outcome of pseudoaneurysm closure.
2. **Complete Occlusion:** Among the cases with successful coil embolization, 85% achieved complete occlusion of the pseudoaneurysm. This suggests that coil embolization is effective in completely blocking blood flow to the pseudoaneurysm, minimizing the risk of recurrence and further complications.
3. **Complications:** Complications occurred in 15% of patients undergoing coil embolization for pseudoaneurysms. The most common complication observed was access site hematoma, accounting for 8% of cases. While complications are relatively low, they highlight the importance of careful patient selection and procedural technique to minimize adverse events.
4. **Patient Satisfaction:** Patient satisfaction scores, assessed using a standardized survey, indicated that the majority of patients (70%) reported being very satisfied with the coil embolization procedure. This suggests that coil embolization is well-tolerated by patients and yields favorable outcomes in terms of patient experience.
5. **Indications and Arterial Locations:** Traumatic pseudoaneurysms were the most common indication for coil embolization, comprising 45% of cases. The femoral artery was the most frequent location for pseudoaneurysms, accounting for 60% of cases. This distribution of indications and arterial locations provides valuable insights into the epidemiology and clinical presentation of pseudoaneurysms in the study population.

Overall, the findings of this study underscore the efficacy and safety of coil embolization as a minimally invasive treatment option for pseudoaneurysms. The high rates of technical success, complete occlusion, and patient satisfaction support the continued utilization of coil embolization in the management of pseudoaneurysms, with careful attention to patient selection and procedural technique to minimize complications.

### **CONCLUSION:**

The findings of this study highlight the efficacy and safety of coil embolization as a minimally invasive treatment modality for pseudoaneurysms at Grande International Hospital in Kathmandu. With a high rate of technical success and favorable patient satisfaction scores, coil embolization emerges as a valuable approach in the management of pseudoaneurysms, offering patients effective treatment while minimizing procedural risks. The study demonstrated that coil embolization achieves successful occlusion of pseudoaneurysms in the majority of cases, with a low rate of complications. This underscores the effectiveness of coil embolization in addressing pseudoaneurysms across various arterial locations and etiologies, including traumatic, iatrogenic, and inflammatory pseudoaneurysms.

Furthermore, the distribution of indications and arterial locations provides insights into the epidemiology and clinical presentation of pseudoaneurysms in the study population, informing clinical practice and patient management strategies. Overall, coil embolization represents a safe and effective treatment option for pseudoaneurysms, offering patients favorable outcomes and high levels of satisfaction. Continued research and refinement of techniques are warranted to further optimize procedural outcomes and enhance patient care in the management of pseudoaneurysms. Through ongoing innovation and collaboration, interventional radiologists can continue to advance the field and improve outcomes for patients with vascular pathology.

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