

Adrenal Myelolipomas: An Interesting Case Series Treated by Laparoscopic Resection in Mexico

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How to cite this paper: Fuentes, H.D., Sandoval, R., Millán, R. and Cueto, G. (2025) Adrenal Myelolipomas: An Interesting Case Series Treated by Laparoscopic Resection in Mexico. *Open Journal of Urology*, 15, 276-286.
<https://doi.org/10.4236/oju.2025.157029>

Received: May 30, 2025

Accepted: July 6, 2025

Published: July 9, 2025

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Abstract

Myelolipoma of the adrenal gland is a rare, benign, non-functioning tumor characterized by the presence of adipose tissue and bone marrow elements. We present a series of cases of myelolipoma of the adrenal gland, all of which were surgically resected laparoscopically. Six cases (72-year-old female patient, 63-year-old male patient, 57-year-old female patient, 61-year-old female patient, 72-year-old female patient, and 56-year-old female patient) of clinically and radiologically suspected cases of symptomatic adrenal myelolipoma are discussed here. All cases described presented with flank pain radiating, which was suspected as an adrenal mass by computed tomography (CT) evaluation. All six cases were histopathologically confirmed as adrenal myelolipoma and managed by laparoscopic surgical excision. The uniqueness of the cases lies in their early detection and the current management with a laparoscopic approach regardless of size, as most cases of large myelolipomas surgically resected reported in the literature are through an open approach. This study shows that the laparoscopic approach is safe for all sizes, with less blood loss and shorter hospital stays.

Keywords

Surgery, Laparoscopy, Myelolipoma, Incidentaloma, Adrenal

1. Introduction

Myelolipomas of the adrenal gland are rare benign neoplasms made up of adipose and myeloid tissue. It was first described in 1905 by Gierke, owing its name to Oberling [1].

Clinically, they are asymptomatic and are usually diagnosed incidentally. When

there is any clinical manifestation, the most common is pain, either abdominal or lumbar [2]. The size is usually less than 5 cm, although myelolipomas have been described as giants up to 34 cm and almost 6 kg in weight [3].

Right laterality is more common in 75% of cases and may even be bilateral in 3.7% of cases. The average age of presentation is between 37 and 65 years, with the male-female ratio being 1 to 1.1 [4]. The size is usually less than 5 cm, although myelolipomas have been described as giants up to 34 cm [5].

Surgical resection is recommended for lesions larger than 4 or 5 cm due to the risk of hemorrhage. Currently, the preferred approach is the laparoscopic route, which offers advantages over open surgery such as shorter hospital stay, faster recovery, less blood loss, and less postoperative pain [6].

2. Case Presentation

2.1. Case 1

A 72-year-old female patient presented in the Urology Department with nausea, vomiting, and intermittent diarrhea months after performing an open cholecystectomy by a general surgeon. Initially, an abdominal ultrasound revealed a left adrenal incidentaloma.

A computed tomography (CT) scan of the abdomen also showed a 9.4×8.5 cm mass near the upper pole of the left kidney. The mass was thought to have come from the left adrenal gland and had an average of -102 HU (**Figure 1**).

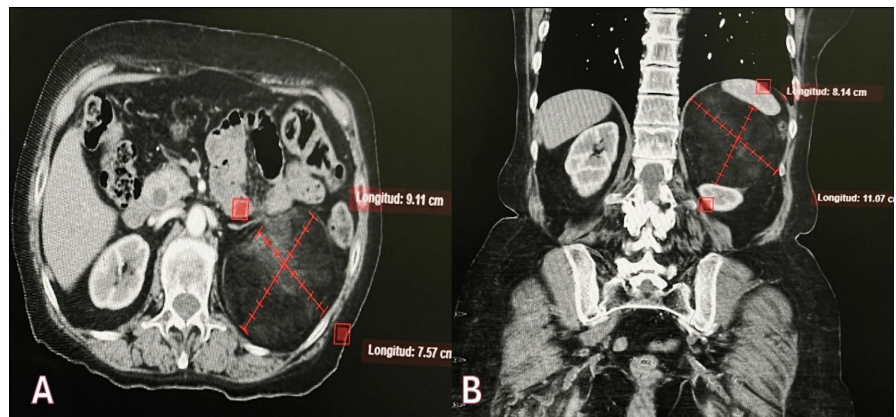


Figure 1. Case 1 CT Scan. (A) Axial section with an incidental finding of a 9.4×8.5 cm mass near the upper pole of the left kidney seen arising from the left adrenal gland shown in the red line; (B) Coronal section with the same mass with an average of -102 HU compatible with myelolipoma; (C) Coronal section with the same mass with an average of -102 HU compatible with myelolipoma.

Due to the dimensions of the mass, it was decided to perform functional tests to measure catecholamines in plasma and levels of metanephrine in urine, as well as a nocturnal suppression test with dexamethasone, all of which were negative.

The patient had a left laparoscopic adrenalectomy using a transperitoneal approach. The surgery lasted 82 minutes and caused about 100 ml of blood loss. A

surgical piece about 10 cm in size was removed. A microscopic examination showed an adrenal angiomyolipoma with hematopoietic tissue with fully matured three cell lines and proliferation of adipocytes. The patient had a good surgical outcome and was sent home on day 2 after surgery. The patient remains disease free three years later.

2.2. Case 2

This was a case of a 63-year-old male diabetic and hypertensive evaluated by the hematology service for anemia. As part of his study protocol, the hematologist decided to request an abdominal ultrasound, finding a left adrenal mass, for which he was referred to the urology department for our evaluation. The patient only reported fatigue and weight loss of 2 kg.

A CT scan was performed that revealed a mass of 11.1×7.4 cm of -35 HU on average, with suspicion of a left adrenal myelolipoma. (Figure 2). Urinary metanephrines and catecholamines were normal. The patient underwent a left laparoscopic transperitoneal adrenalectomy. The estimated blood loss was 120 ml, and the operative time was 94 minutes. A tumor was obtained approximately 11 cm macroscopically, with a light brown color, smooth, soft, and microscopically with adipose and hematopoietic tissue compatible with myelolipoma.

The patient was discharged on the 3rd postoperative day, requiring a blood transfusion due to the presence of anemia but not related to the surgical procedure. He continued his follow-up with hematology, who gave a diagnosis of hemolytic anemia. Patient is disease free 5 years after surgery.

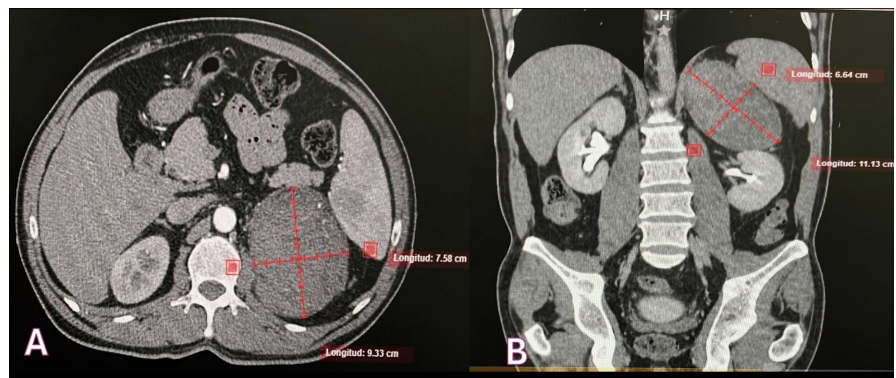


Figure 2. Case 2 CT scan. (A) Axial section with an incidental finding of a mass 11.1×7.4 cm near the upper pole of the left kidney seen arising from the left adrenal gland shown in the red line; (B) Coronal section with the same mass with an average of -35 HU compatible with myelolipoma.

2.3. Case 3

A 57-year-old female patient with systemic arterial hypertension, was referred to our service due to the presence of Reno ureteral colic pain on the right side, for which a simple abdomino-pelvic tomography was requested, where a hyperdense image was found in the renal pelvis measuring 6mm compatible with stone, as

well as a right adrenal incidentaloma measuring 4.7×3.3 cm with -25 HU on average compatible with a myelolipoma (**Figure 3**). After performing functional tests, which were negative, it was decided to perform a right laparoscopic adrenalectomy via transperitoneal route; estimated blood loss was 20 ml, and operative time was 62 minutes. A surgical specimen of approximately 4 cm, red and yellowish in color, with a smooth surface, was obtained. The microscopic study revealed hematopoietic cells with adipocytes and a slight area of central hemorrhage, concluding in a myelolipoma.

The patient had a favorable post-surgical evolution; she was discharged 24 hours after surgery. Patient is healthy and disease free 2 years after surgery.

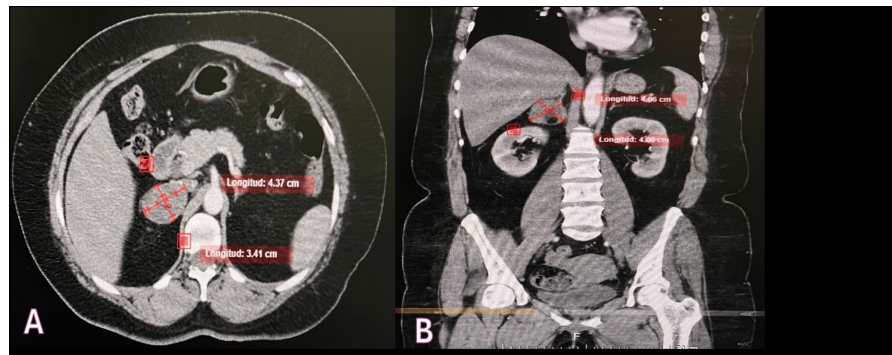


Figure 3. Case 3 CT scan. (A) Axial section with an incidental finding of a 4.7×3.3 cm mass near the upper pole arising from the right adrenal gland shown in the red line; (B) Coronal section with the same mass with an average of -25 HU compatible with myelolipoma.

2.4. Case 4

The nephrology service referred a 61-year-old female diabetic with systemic arterial hypertension to urology. The nephrology service requested a tomography because of the patient's discrete elevation of creatinine, which suggested obstructive uropathy.

A CT scan showed that there was no kidney or ureteral stone, but there was a 14.4×9 cm mass with an average of -32 HU at the level of the right adrenal gland that was consistent with a myelolipoma (**Figure 4**). Metanephrines were measured in plasma and urine, resulting in a non-functioning tumor.

A right laparoscopic adrenalectomy was performed, estimated blood loss was 70 ml, and operative time was 72 minutes, obtaining a surgical specimen of approximately 14 cm, which was sent to pathology.

The histopathological examination revealed the presence of adipose cells with hematopoietic tissue from the three cell lines, which were compatible with myelolipoma. Two days after the surgery, we discharged the patient without any complications. A follow up CT scan was performed 2 years later with no evidence of disease.

2.5. Case 5

A 72-year-old female who began her condition with the presence of constipation

alternating with episodes of diarrhea, as evaluated by the gastroenterology service, requested an abdominal ultrasound where a left adrenal mass was found and was referred to the outpatient clinic of our hospital. CT scan with contrast showing a left adrenal mass measuring 9.0×9.2 cm with -50 HU on average (**Figure 5**).

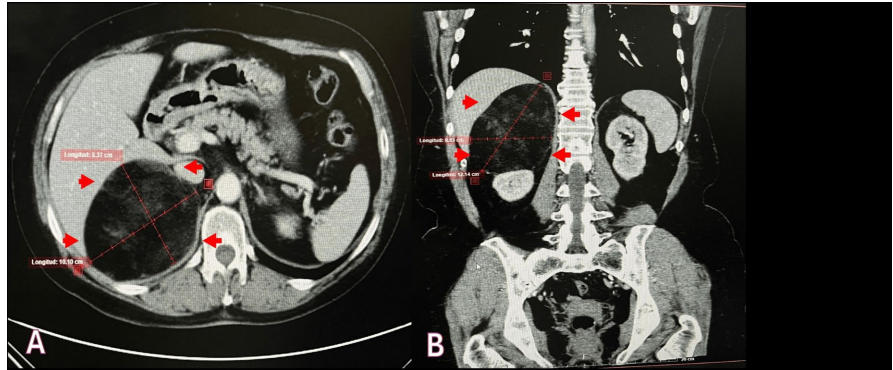


Figure 4. Case 4 CT scan. (A) Axial section with an incidental finding of a 14.4×9 cm mass near the upper pole of the right kidney seen arising from the right adrenal gland shown in the red arrows; (B) Coronal section with the same mass with an average of -32 HU compatible with myelolipoma.

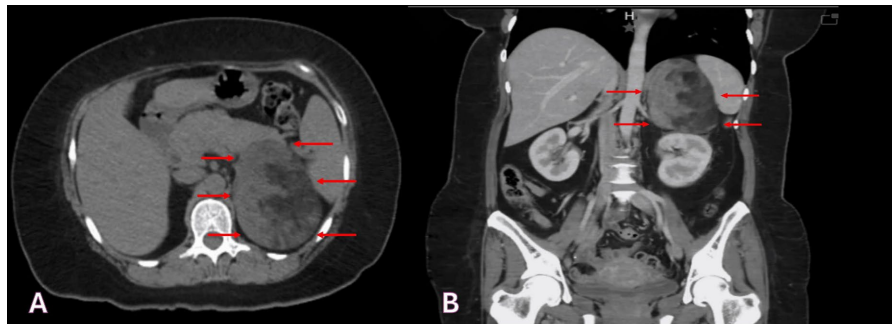


Figure 5. Case 5 CT scan. (A) Axial section with an incidental finding of a 9.0×9.2 cm mass near the upper pole of the left kidney seen arising from the left adrenal gland shown in the red arrows; (B) Coronal section with the same mass with an average of -50 HU compatible with myelolipoma.

We perform functional tests, measure catecholamines in plasma and urine, and conduct a nocturnal suppression test with dexamethasone.

As there was a non-functioning left adrenal incidentaloma and a suspicion of myelolipoma, it was decided to do a left laparoscopic adrenalectomy using a transperitoneal approach. The surgery took 64 minutes and 50 ml of blood was lost. The surgical specimen measured approximately 11 cm in size. We observed adipose cells and hematopoietic tissue compatible with myelolipoma under the microscope.

One day after surgery, the patient underwent an adequate postoperative recovery and received her discharge. She continued his follow-up with gastroenterology, who diagnosed him with irritable bowel syndrome. Patient is disease free 1 year after surgery.

2.6. Case 6

A 56-year-old female began experiencing intermittent left flank pain and hematuria, leading her to undergo a CT scan with contrast, which showed a right adrenal mass measuring 4×3 cm with an average of -40 HU (**Figure 6**).

We performed functional tests, measured catecholamines in plasma, and examined urine.

Given the presence of a non-functioning right adrenal incidentaloma as a suspicion of myelolipoma, it was decided to perform a right laparoscopic adrenalectomy using a transperitoneal approach; the estimated blood loss was 20 ml, and the operative time was 52 minutes. The surgical specimen has a macroscopic appearance of approximately 5 cm. We observed compatibility between adipose cells and hematopoietic tissue under a microscope. Follow up CT scan at 2 years showed no evidence of disease.

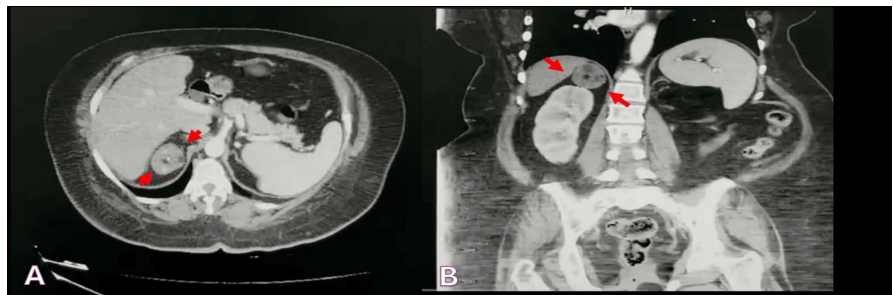


Figure 6. Case 6 CT scan. (A) Axial section with an incidental finding of a 4×3 cm mass near the upper pole of the right kidney seen arising from the right adrenal gland shown in the red arrows; (B) Coronal section with the same mass with an average of -40 HU compatible with myelolipoma

3. Discussion

Adrenal myelolipomas are usually an incidental finding and are mostly diagnosed at the time of work-up for other suspected diseases [6]. The diagnosis also emerged incidentally in the current case series.

Medical literature reveals the prevalence of a tumor in the right adrenal gland, as seen in **Table 1** [7]. This was not our case; three of them were in the left adrenal gland and three on the right.

Another intriguing observation from this case series is that, as mentioned in the literature, these tumors are small [8].

However, in the present case series, 4 of 6 tumors were larger and measured about 8 cm. **Figure 7** shows the size of the specimens in our case series.

Although a greater size poses a threat for malignant transformation, in the present study, all the cases were benign.

Furthermore, the greater the size, the greater the probability of spontaneous rupture; in all our cases, none of them presented as a spontaneous retroperitoneal bleeding [9].

In all cases, the management was a laparoscopic adrenalectomy with a trans-

peritoneal approach. **Table 2** shows the intraoperative outcomes of our case series. Several retrospective and comparative studies have addressed the advantages of minimally invasive adrenalectomy, specifically in terms of less postoperative pain, improved patient satisfaction, shorter hospital stay, and recovery time when compared to open adrenalectomy [10].

Table 1. Comparative features of adrenal myelolipomas reported in some studies.

S. No.	Author	Year	No. of cases	Sex	Age (years)	Side	Size in largest dimensions	Presentation	Management
1.	Bhansali A <i>et al.</i> , [10]	2003	6	3M3F	26 - 60	5 Right 1 Left	5 - 25 cm	2 Asymptomatic 4 Pain abdomen	Surgical resection
2.	Wani N <i>et al.</i> , [11]	2010	2	2M	48 - 52	2 Right	10 - 16 cm	1 Asymptomatic 1 Pain abdomen	Surgical resection in 1 patient
3.	Hsu SW <i>et al.</i> , [12]	2012	6	3M3F	44 - 51	5 Right 1 Left	6 - 16.5 cm	3 Asymptomatic 3 Pain abdomen	Surgical resection
4.	Nabi J <i>et al.</i> , [13]	2013	1	M	63	Right	6.5 cm	Pain right abdomen	Surgical resection
5.	Sachan A <i>et al.</i> , [14]	2018	1	M	40	Right	10 cm	Pain right abdomen	Surgical resection
6.	Ruchi R <i>et al</i> [15]	2021	3	1M2F	42 - 55	2 Right 1 Left	4 - 13 cm	1 Asymptomatic 2 Symptomatic	Surgical resection
7.	Present case series	2024	6	1M5F	48 - 72	3 Right 3 Left	14 × 9 cm	3 Asymptomatic 3 Pain abdomen	Surgical resection

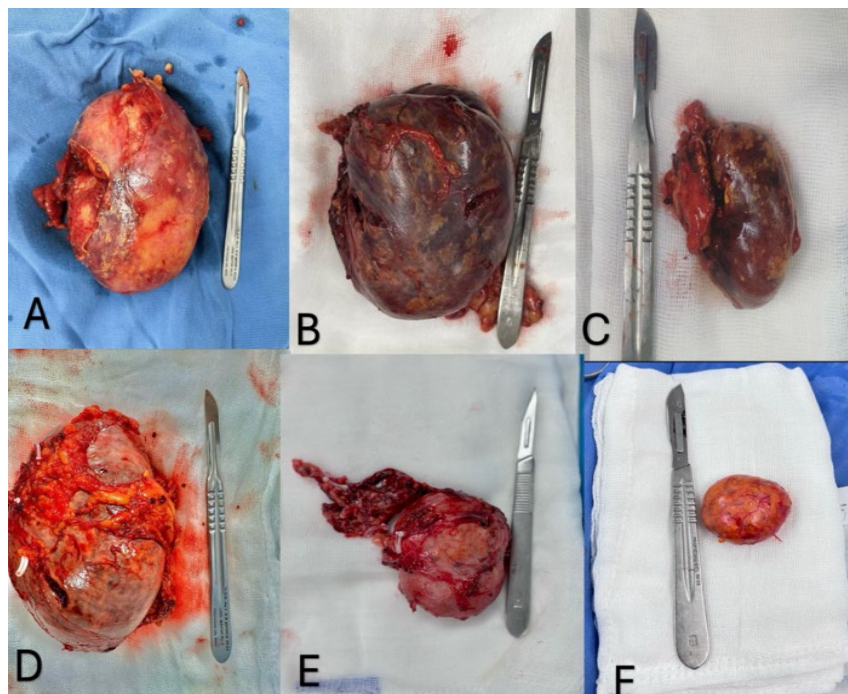


Figure 7. Gross specimens of all myelolipomas. (A) Case 1; (B) Case 2; (C) Case 3; (D) Case 4; (E) Case 5; (F) Case 6.

Table 2. Mean operative outcomes.

INTRAOPERATIVE OUTCOMES	
Operative time (min) mean	74.8 min
Intraoperative estimated blood loss (ml)	72 ml
Conversion to open surgery	0 cases
Intraoperative complication, (n) according to the modified Clavien system.	0 cases
Patient discharge time (days)	1.8 days

The laparoscopic transabdominal lateral adrenalectomy is currently the most widely used approach [11].

This technique effectively managed all our cases. In our cases, the first peritoneal access is made 2 cm below the right or left costal margin in the midclavicular line with CO₂ is at a pressure of 15 mmHg. Optical access Place a 10- to 12-mm trocar for the endoscope in the pararectal line, 5cm above the umbilicus. Under direct vision, position the second 10 - 12 mm trocar medially next to the first one. The third trocar (5 mm) is inserted 3 cm above the anterior superior iliac spine in the anterior axillary line. The fourth trocar (5 mm) is inserted at the subcostal angle. The key factor for adequate exposure is effective dissection of the Toldt fascia. We ligate the vascular structures with Hem-O-Lock and then use ultrasonic energy to dissect the adrenal gland. We extract the adrenal through a Gibson-type incision, leaving a Penrose drain in all cases, which we remove upon the patient's discharge.

Surgical treatment for adrenal masses is usually warranted when the lesions are clinically significant, hormonally active, or of considerable size. The likelihood of cancer increases notably for tumors larger than 6 cm, which is recognized as the threshold for surgery. Small, non-functioning tumors can be safely monitored with yearly imaging, whereas those greater than 7 cm typically require removal due to a higher risk of malignancy [12].

Giant myelolipomas (over 10 cm) are frequently linked to complications during surgery, such as bleeding, capsule rupture, and increased chances of local recurrence. Open radical adrenalectomy remains the standard procedure in cases of large myelolipomas or emergencies involving bleeding or rupture [13]. The largest recorded myelolipoma excised was 31 × 24.5 × 11.5 cm in size and weighed 6 kg, completed via open surgery by Akamatsu [14].

The minimally invasive approach, first described by Gagner in 1992, has become increasingly favored. It offers advantages like less postoperative pain, shorter hospital stays, and faster recovery, making laparoscopic adrenalectomy the preferred option for smaller, benign lesions such as adrenal myelolipomas [15].

Several studies in the literature have examined the use of laparoscopic techniques for the removal of giant adrenal myelolipomas. Adrenal myelolipomas with diameters greater than 10 cm have been successfully approached using transperitoneal laparoscopy. Notably, none of the cases reviewed required conversion to open surgery, which underscores the feasibility of laparoscopic management

for such large tumors [16].

Minimally invasive procedures offer clear advantages over traditional open surgery, including reduced pain, decreased blood loss, shorter hospital stays, quicker recovery times, and a lower risk of surgical site infections. In all cases reviewed, no complications related to laparoscopic techniques were observed [17]. The current series was effectively managed via a transperitoneal laparoscopic approach, with postoperative follow-up confirming an uncomplicated recovery.

4. Conclusion

In conclusion, adrenal myelolipoma is an asymptomatic, nonfunctional adrenal mass. Giant myelolipomas require surgical treatment and given their large diameter and potential for hemorrhagic rupture, open surgery may be an option in those cases. There are different advantages of the minimally invasive approach compared with the traditional approach: less pain, shorter hospitalization, and faster recovery, as reported in our study. Our cases suggest that >10 cm myelolipoma could be removed safely with a laparoscopic approach, without any intra- or postoperative complication, providing a better outcome to the patient.

Author Contributions

Conceptualization, H.D. F and R.M.; methodology, H.D.F.; data curation, H.D.F.; writing—original draft preparation, H.D.F.; writing—review and editing, H.D. F and G.C.; supervision, H.D. F and R.S. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement

Consent for treatment and open access publication was obtained or waived by all participants in this study. Clinical Trials issued approval NCT06525467. Consent for treatment and open access publication was obtained or waived by all participants in this study. Mexican Institute of Social Security issued approval 98235522. Written informed consent was obtained from the patient for the publication of this case report and accompanying images. The study was registered in Clinical-Trials.gov.

Informed Consent Statement

Consent for treatment and open access publication was obtained or waived by all participants in this study. PRS Clinical Trials issued approval NCT0625.

Data Availability Statement

The original data presented in the study are openly available via e-mail at huber_576@hotmail.com.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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