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Massive hemoptysis. Selective embolization of bronchial artery-left pulmonary artery fistula. How would I approach it?



Hemoptisis masiva. Embolización selectiva de fístula de arteria bronquial a arteria pulmonar izquierda. ¿Cómo lo haría?

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HOW WOULD I APPROACH IT?

This is the case of a massive hemoptysis requiring orotracheal intubation where the origin of the hemorrhage can be clearly identified in a fistula from the left bronchial artery—with fistulous trajectory—to the left pulmonary artery upper branch.

In view of the situation, and once the patient has been stabilized with right selective intubation, discussion starts on how to save the lung from blood content.

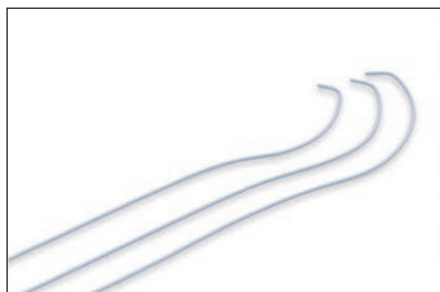
Currently, interventional radiology in Spain is available in almost every PCI-capable center meaning that our participation as interventional cardiologists is not required anymore. However, thanks to the «infarction code» network, the geographic availability of cath labs is even greater compared to vascular interventional radiology suites, as it happened to us in our beginnings.

In this case, the source of bleeding has already been found, which means we can attempt the catheterization of the bronchial artery right away. Access via pulmonary artery is indicated for cases when the bronchial artery cannot be catheterized. In these cases, it'd be closed with coils as selectively as possible to prevent massive pulmonary infarction from happening.¹

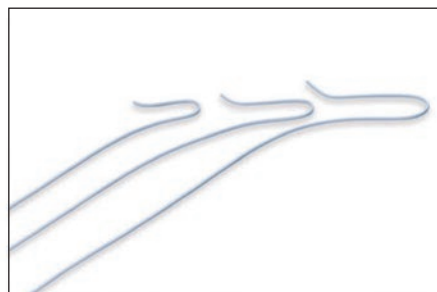
Cardiologists have a great variety of devices available to catheterize arteries originate at the aorta like the coronary or bronchial arteries. «Visceral» catheters like the COBRA one work great to catheterize this kind of ostia while highly «torqueable» and harmless hydrophilic catheters are used to study coronary ostia (figure 1).

SELECTIVE VISCERAL CATHETERS

COBRA



SIDEWINDER



FEMORAL RENAL with 2 orifices

Lateral

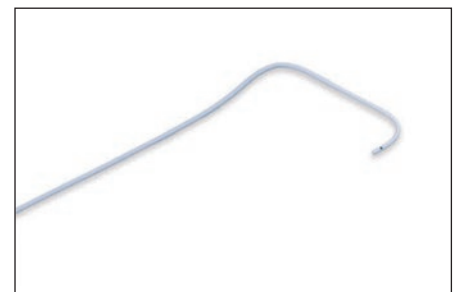


Figure 1. Visceral catheters used to study the branches of both the ascending and the descending aorta.

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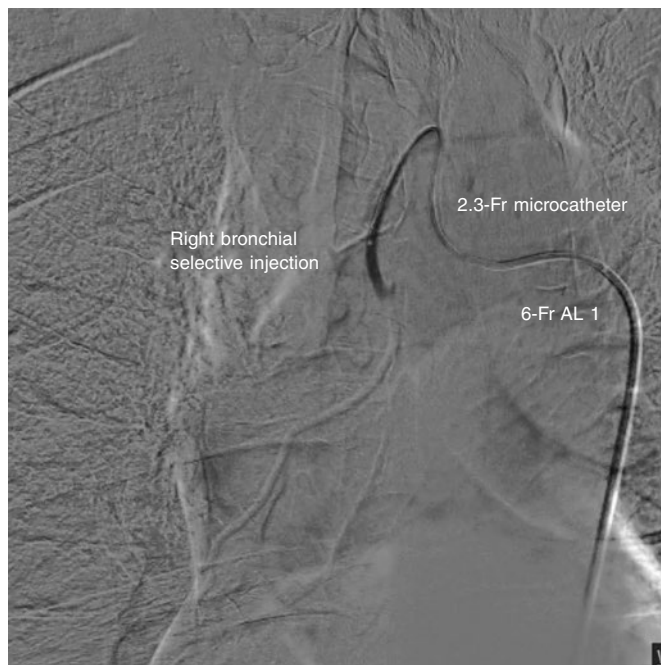


Figure 2. Selective injection into right bronchial artery. After catheterization with the Amplatz 1 guide catheter, a microcatheter is mounted over a 0.14 in guidewire.

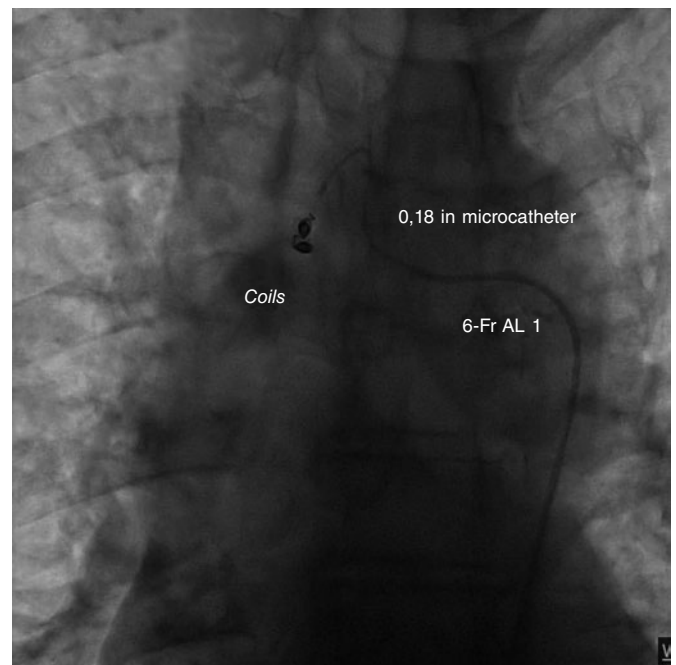


Figure 3. Embolization of the right bronchial artery with 0.18 in coils.

Since these catheters are often unavailable at the cath lab, the Amplatz guide catheter with apex curve can be used as if we were looking to perform a bypass, and even an EBU guide catheter to modify the curve with another guidewire through the straight end. Once the artery has been catheterized, although not selectively, passing a 0.14 in guidewire can be relatively easy to do to bring stability to the whole surgical kit. Using the radial or femoral access is something that's completely irrelevant. However, since location is in the thoracic aorta, the femoral access could be one we're most comfortable with in intubated patients (figure 2).

A 2.4-Fr microcatheter can be mounted over this guidewire for 0.18 in coils or even a 4-Fr catheter to inject embolization material by thoroughly selecting the target area as much as possible.

I would rather use 0.18 in coils as the method of choice to release them before ever reaching the fistulous trajectory. Afterwards, I'd check whether it has been properly sealed and no collaterals have been recruited prior to the fistulous trajectory (figure 3).

In no coils are available, I'd probably use embolization material like Spongostan gelatin sponge to create gel particles that can stop the bleeding when they can't get through. It is mixed from 2 syringes containing serum, contrast, and small «confetti» layers of Spongostan that are linked through a 3-way stopcock.² The content from one syringe is passed on to the next until it has the consistency of small pieces of gel. I would gently inject it through the microcatheter, and if the contrast agent still couldn't make it through the fistulous trajectory, I'd keep on injecting at low pressure. This can stop the bleeding and help achieve the effect obtained with the coils when we've ran out of them, and passage is still not under control. I would never use particles because they migrate through the fistulous trajectory and cause massive pulmonary infarction.

Finally, if the bleeding cannot be stopped, I would leave a balloon inflated to gain time to evacuate the patient to thoracic surgery or the interventional radiology suite.

The takeaway message is that we need to be prepared one way or another³ to solve emergency complications that can be solved using interventional radiology techniques in places where an angiographer—for the lack of an experienced radiologist—is available.

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CONFLICTS OF INTEREST

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Massive hemoptysis. Selective embolization of bronchial artery-left pulmonary artery fistula. Case resolution



Hemoptisis masiva. Embolización selectiva de fístula de arteria bronquial a arteria pulmonar izquierda. Resolución

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CASE RESOLUTION

Emergency transfer of the patient to the cath lab was decided for pulmonary angiography and endovascular embolization. A 5-Fr femoral introducer sheath was used to insert a vertebral catheter with which a largely developed bronchial branch was selectively catheterized (emergency from the aortic arch) towards the pulmonary parenchyma creating a high-flow arterio-arterial fistula with a segmental arterial branch of the lung left upper lobe ([video 1 of the supplementary data](#)). Afterwards, a 2.4-Fr (proximal diameter)/1.9-Fr (distal diameter) Echelon 14 microcatheter was passed (Medtronic, United States) through which 2 6 mm × 20 mm Axiom Prime 3D detachable coils (Medtronic, United States) were implanted from the distal to the middle third of the bronchial tree ([figure 1](#)). The target vessel was successfully embolized resulting in an overt decrease of the cardiac output at fistula level ([video 2 of the supplementary data](#)). Procedure was performed uneventfully. After it was completed the amount of vasopressor drugs (noradrenaline and vasopressin) administered was gradually reduced. Forty-eight hours later, the patient was extubated and weaned from mechanical ventilation. Seventy-two hours after the procedure, a follow-up coronary computed tomography angiography confirmed consolidation in the apical and posterior segments of left lower lobe and left perihilar region without evidence of contrast extravasation at the embolization site. Since the patients showed no signs of hemoptysis she was discharged from the hospital 6 days after admission.

Pulmonary circulation depends on pulmonary and bronchial arteries alike. While the pulmonary artery and its branches make up a low-pressure system that supplies the pulmonary parenchyma mainly, the circulation that comes from the bronchial arteries has a relatively high pressure and supplies the endobronchial tree basically. It is responsible for only 2% of the lung overall vascular supply. In 90% of the cases of potentially life-threatening hemoptysis the origin of bleeding is the bronchial followed by the pulmonary arteries or an unidentified source of bleeding in the remaining 10% of the cases.¹ Regarding the main etiologies involved, the case series published to this date include bronchiectasis, tuberculosis, and pulmonary malignant neoplasms. Although its exact incidence rate is still unknown, systemic-pulmonary fistula is rare and has often been misrepresented as the cause of hemoptysis. In cases of massive hemoptysis, treatment

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