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HISTORY ARTICLE

Current situation: angiology and vascular surgery service

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As of 2011, with an independent concept of heart surgery with the endorsement of the Mexican Society of Angiology, Vascular and Endovascular Surgery plus the creation of the *Universidad Nacional Autónoma de México* (UNAM) Postgraduate course, the first service was created with doctors specializing in Angiology, Vascular and Endovascular Surgery, integrated by doctors with a license and title of the specialty in charge of Dr. Miguel Ángel Sierra Juárez.

The functions of the service are based on attending to the entire population of the country with vascular problems; arterial, venous and lymphatic, except heart and intracranial territory, the human resources are made up of 5 attached doctors and 11 residents who are invaluable elements in the operation of the service: Dr. Amparo Quintana Aceves, Dr. Marlon Eduardo Lacayo Valenzuela, Misael Sánchez Tamariz, M.D., Taztzari Martínez Corina, M.D., Daniela Mabel Notabile, M.D., Alan Issac Valderrama Treviño, M.D., Fernando Guillermo Ramírez Estrada, Gerardo Martínez Estrada, Gerardo Martínez Méndez, M.D., Itaty Carolina González Martínez, M.D., Alejandro Oropeza Vaca, M.D., Luis Burgos, M.D., Diana de la Luz Bustamante Trujillo, M.D., Verónica Rubio Anaya, M.D., Angélica Espinosa Hinojosa, M.D., and Carlo Stefanoni Pérez, M.D.

From the moment of its creation to date, the service has transformed exponentially; it has always been characterized by receiving complex cases or with multiple out-of-hospital treatments. Traditionally-shaped procedures with vessel incisions (open surgery) are within the hospital's therapeutic arsenal. But since 2021, the free program led by the Presidency of the Republic, provided the support of Endovascular material. This allowed us to offer the population of our hospital the alternative of more modern treatments in vascular surgery, endovascular therapy is currently a more modern tool in the care of vascular conditions; we can compare its evolution with open cholecystectomy surgery, which is currently operated with small ports and less risk of morbidity and mortality for patients. Similar is the endovascular evolution. Initially, we had to operate with open surgery with very wide incisions despite being short lesions with prolonged periods of tissue ischemia, high risk for patients with comorbidities, and a greater amount of bleeding. Nowadays, endovascular therapy is free of wounds; everything is by puncture of small introducers, there are no prolonged periods of ischemia, serious patients can be operated on, and bleeding is nil, the service develops in many cases hybrid techniques that combine open surgery plus endovascular.

The training and skills of the staff have allowed them to have skills in endovascular procedures; It is difficult to mention all the advances and the territories served with the benefit of endovascular therapy. Today, it is the procedure of excellence worldwide and the General Hospital of Mexico is contributing a grain of sand by offering this tool to the most vulnerable population of the country that has low resources, allowing them to return, as soon as possible, to their activities. In the national congresses, the school of the General Hospital of Mexico is dressed in congratulations and admiration when observing the evolution of the service toward the application of technology. We have always been a benchmark for the complex management of vascular

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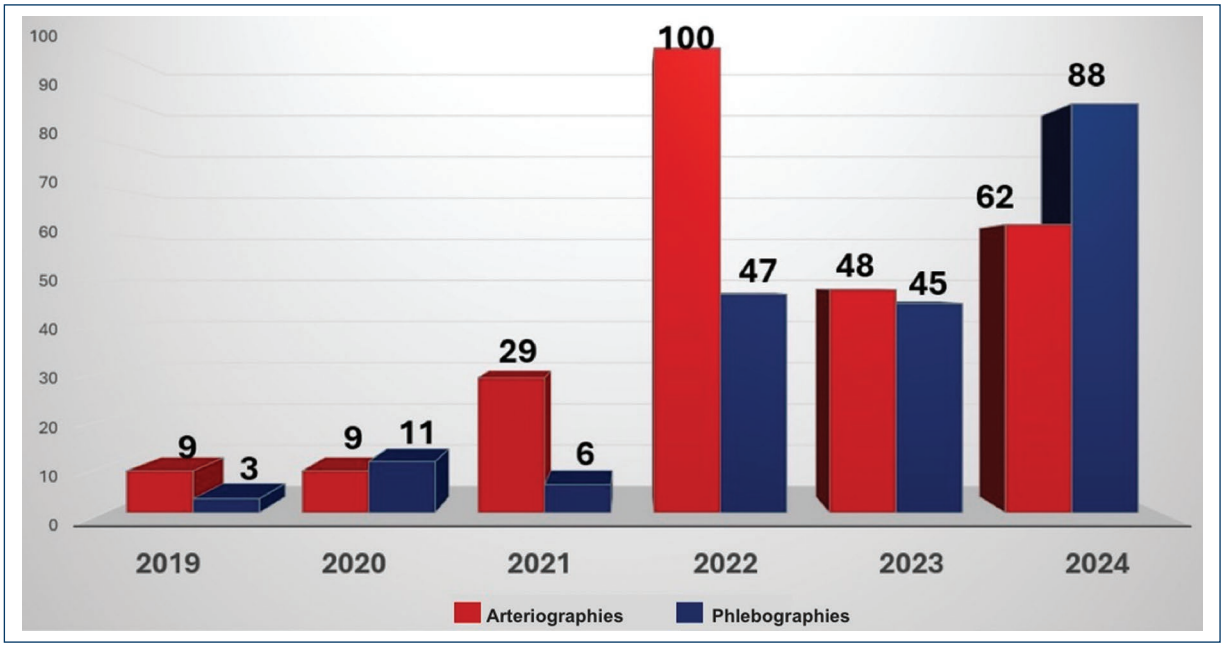


Figure 1. Diagnostic-therapeutic endovascular studies.

surgery, but now that we add technology, the results are better every day.

In figure 1, red columns, we analyze the arteriogram, diagnostic and therapeutic studies that add up to a total of 257 cases in 6 years, the largest number were obtained in 2022 when we have more surgical time in the hemodynamics room, The cases included here correspond to complex pathologies of the arterial territory resolved with endovascular therapy, cases of acute or chronic ischemia secondary to cholesterol plaques or thrombi that threaten the limb loss has been prevented with thrombus aspiration equipment, atherectomy equipment to remove plaques, balloon angioplasty and stent placement of various diameters with room controls through endovascular ultrasound, carotid stent placement, embolization of carotid Glomus for resection with less bleeding, treatment of traumatic arteriovenous fistulas, embolization of malformations, diabetic foot with macro angiopathy, mesenteric ischemia, renovascular hypertension, embolization of hypogastric etc. We present a case of a female patient who presents with arterial disease with ischemia of both extremities after several sessions of radiotherapy in the pelvis for cervical cancer. He comes with intense pain of both limbs when walking at 50 m with digital necrotic lesions. Angioplasty was performed with a medicated balloon, improving pain when walking, reaching a distance of more than 200 m without pain, and the ischemic lesions disappeared (Fig. 2)

In figure 1, blue columns, the report of phlebography, diagnosis and therapy is shown, which add up to a total of 200 cases in 6 years, the highest number of cases from January to September 2024, the results express complex cases of venous pathology, such as acute and chronic vena cava and iliac thrombi which have been resolved with thrombus, mechanical drug aspiration plus placement of a vena cava filter and in some cases, balloon angioplasty plus venous stents, thus avoiding mortality due to pulmonary embolism. In cases of chronic venous insufficiency (varicose veins), advanced management of modern techniques, such as laser, radiofrequency, sclerotherapy, and micro-incisions, improve the quality of life of patients, the closure of venous ulcers, reducing costs for re-interventions or rest days by allowing the patient a faster recovery. Complex cases of central vessel stenosis secondary to catheter use, pelvic venous disease with dilated veins in pelvic floor veins with leak points to the perianal and gluteal region, incompetence of gonadal strains, compressive syndromes of the left renal vein and left iliac vein, symptomatic, which with endovascular therapy, placement of coils plus foam with polidocanol or venous stent, patients have presented improvement in their quality of life, Post-thrombotic syndrome with the development of severe venous disease in the extremity,

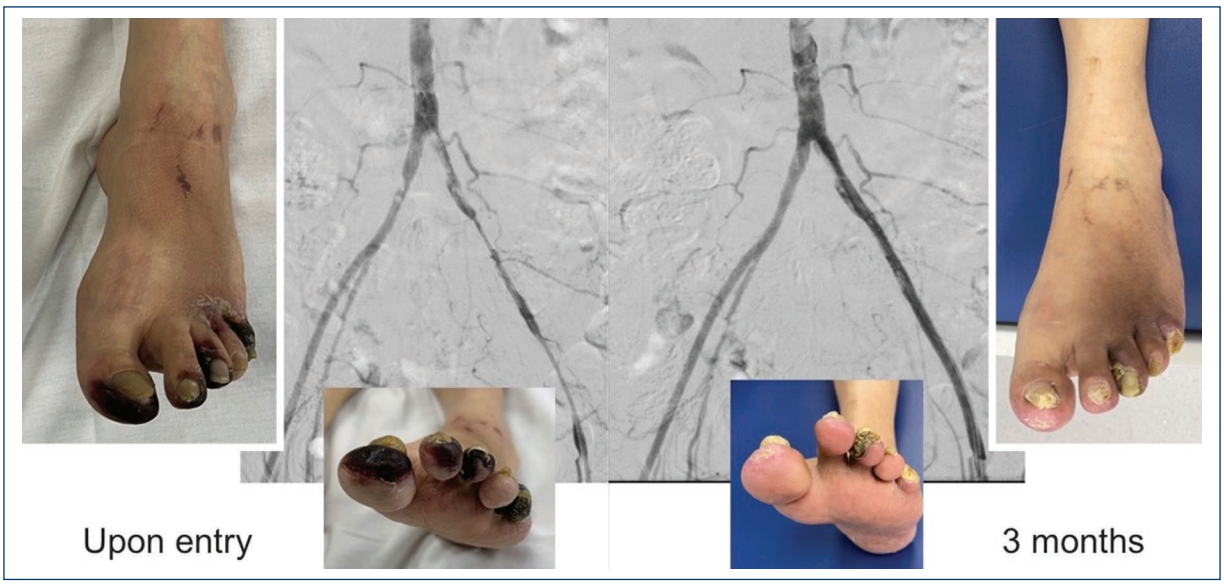


Figure 2. Presentation of the case of a female patient presenting arterial disease with ischemia of both lower extremities after radiotherapy sessions. Medicated balloon angioplasty with improvement of the ischemic lesions.

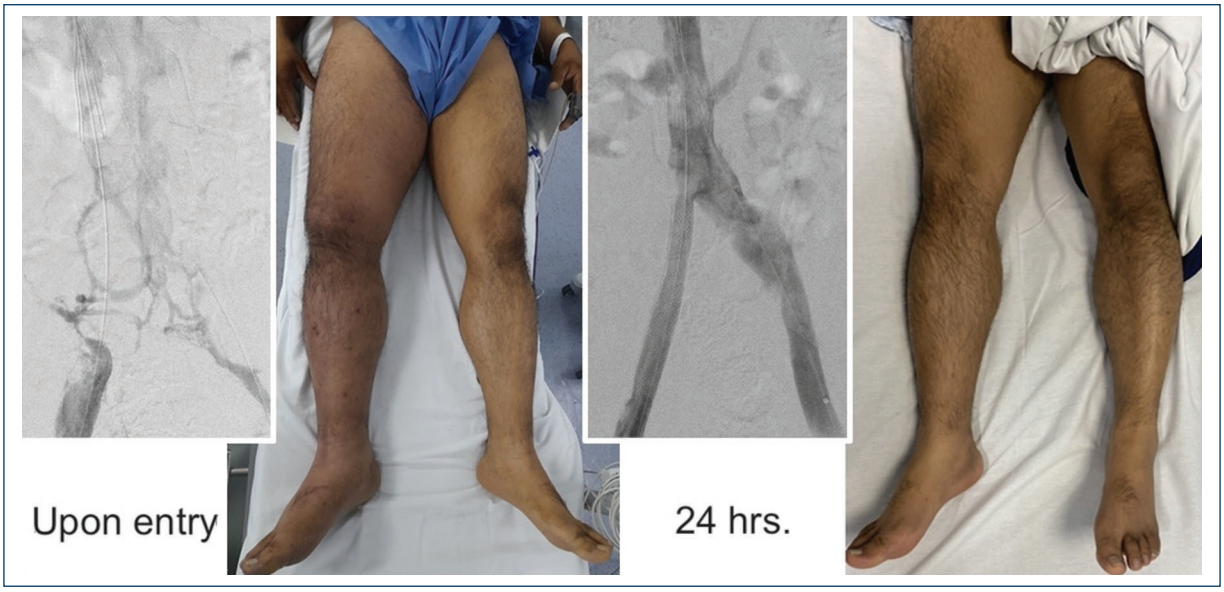


Figure 3. Patient diagnosed with venous thrombosis of the right leg (phlegmasia), removal of clots with a pharmacological mechanical thromboaspiration system, achieving total patency of the vein. Management on the floor and discharge at 24 hours with oral anticoagulation.

ochre pigmentation, edema, venous ulcer treated endovascularly with balloonplasty and more venous stent, improving the outflow and relieving the symptoms of patients, stenosis of arteriovenous fistulas where the path of the arm vein presents stenosis of the vessel secondary to recurrent puncture with balloons. We present in figure 3 a case of phlegmasia of the right extremity with severe venous involvement (tension edema, cyanosis, intense pain and decreased pulse) to complicate arterial flow with data of systemic shock and compromise of limb viability that was resolved with placement of a vena cava filter, removal of clots with thrombus system, pharmacological mechanical aspiration with injection of heparin plus thrombolytic pressure

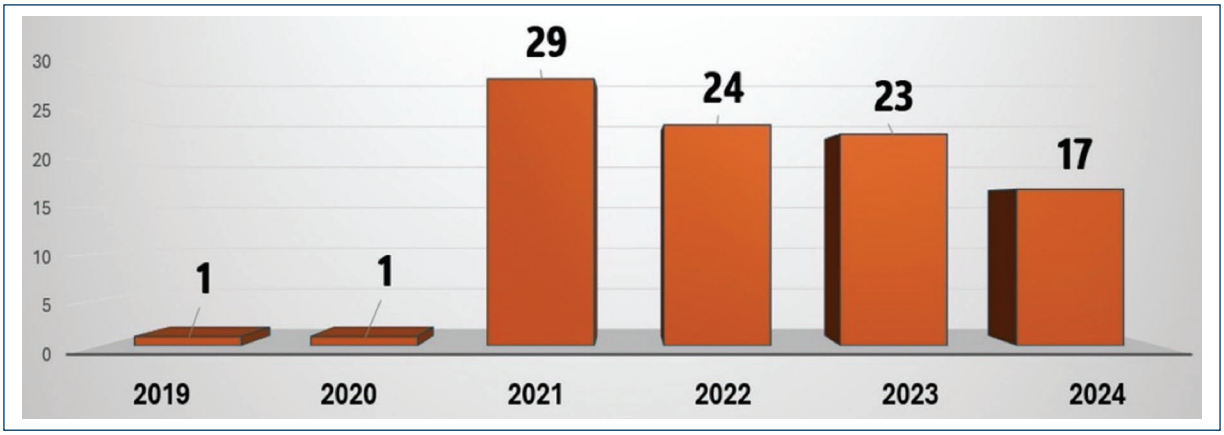


Figure 4. Diagnostic-therapeutic endovascular studies of the aorta.

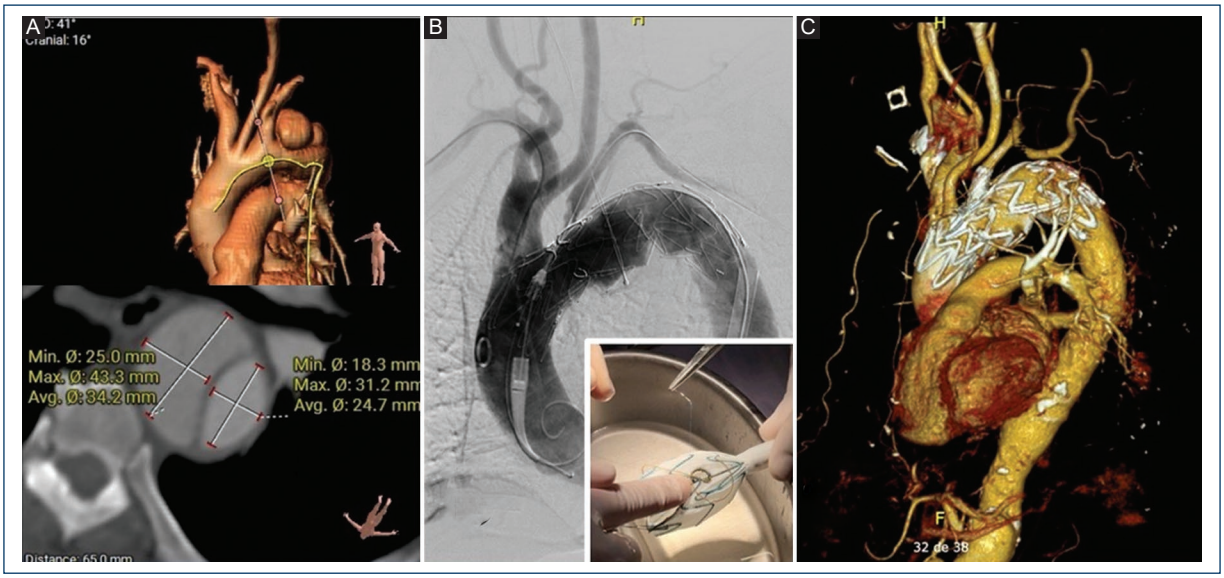


Figure 5. A: thoracic aortic dissection with neck vessel involvement to exclude the site of aortic rupture, the stent had to occlude the carotid artery. **B:** the stent is disassembled; the vessel orifices are marked with subsequent cannulation of the orifices and placement of a covered stent, creating an artificial branch called a "fenestra". **C:** control tomography at 6 months, exclusion of aortic dissection.

into the vein for 30 min, subsequent aspiration of the thrombus achieving total permeability of the vein, management on the floor and discharge after 24 h with oral anticoagulation.

Figure 4 shows the endovascular aortic procedures, 124 cases of aortic stenting, covered endovascular reconstruction of the aortic bifurcation (CERAB) technique, and kissing stent have been performed. Conditions, such as aneurysm and abdominal aorta, thoracic and thoraco-abdominal dissections resolved with placement of aortic stents with various versions of the technique, such as: scallop (window of the stent so as not to occlude main vessels), chimneys (placement of stents on one side of the stent to allow flow to the vessel), fenestration (holes in the stent in an artisanal way and subsequent cannulation to place a stent that allows flow to the vessel) for branches supra-aortic and mesenteric or renal vessels of the trunk. The placement of aortic stents is very large stent configured for vessels of larger diameters to redirect the flow over the normal lumen, avoiding the surgical option is a possibility, but increases the morbidity and mortality of patients due to the wide exposure that requires very extensive wounds with impingement of the vessel that causes ischemia

of the renal tissues intestinal and limb diseases at risk of loss. Most patients have comorbidities, as well as coronary artery disease, bleeding after surgery is greater, and the length of stay in therapy is greater. In Leriche-type aortoiliac disease (disease of the iliac aortic segment characterized by absence of pulse, gluteal pain and impotence), double stents or double balloon (kissing) or CERAB techniques have been performed, placement of a coated stent in the abdominal aorta and two stents for each iliac, Endovascular therapy in this territory has avoided severe ischemia of the mesenteric territory. Pelvic floor and both extremities, allowing to improve arterial flow to the diseased territory, most patients present pain when walking without palpable pulses, with treatment, the pain decreases and gait increases. We present a case of thoracic aortic dissection with involvement of vessels in the neck, to exclude the site of aortic rupture, the stent had to occlude the carotid artery and subclavian artery to avoid arm ischemia and cerebral ischemia. The stent is dismantled, the holes of the vessels are marked with subsequent channeling of the holes and placement of a coated stent creating an artificial branch called fenestra, the performance of the procedure requires hours of planning and advanced endovascular skills in a few places in the country, which is developed due to the lack of resources and technical skills (Fig. 5).

The results and benefits of endovascular therapy are very favorable in the population of the General Hospital of Mexico, support should continue to allow patients with vascular conditions to benefit from lower risk of morbidity and mortality and a prompt recovery to their activities, complying with the quality standards that require Mexico to show the world that it also has the capacity to provide a modern and effective alternative in medical care.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The Sex and Gender Equity in Research guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.