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Use of CO_2 Arteriography in the follow-up of patients with Thromboangiitis Obliterans

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Abstract **Case Report**

***Introduction*:** Thromboangiitis obliterans or Buerger's disease is a non-atherosclerotic, segmental and inflammatory vaso-occlusive disease that appears mainly in medium and small sized arteries. Clinically, the most common manifestations are consistent with symptoms of ischemia of the lower extremities, intermittent claudication is the earliest onset sign [3]. An arteriography may be performed as a follow-up method in patients with long-standing disease and persistent symptomatology. With technological development, CO_2 arteriography, approved by the FDA, has become an alternative to that performed with iodinated contrast, especially in patients hypersensitive to iodine or with compromised renal function as in our patient [6, 7]. ***Clinical case*:** A 62-year-old patient with a personal history of arterial hypertension, stage III renal disease and Thromboangiitis obliterans for 20 years. The patient comes to the control of his disease with symptoms characterized by intermittent claudication with a distance of 200 meters in the left lower limb. He continues with his smoking habit and states that he does not plan to stop. On physical examination, palpation of proximal pulses is normal, distal pulses are not palpable, but they are audible with sound Doppler in both extremities. Due to the progressive deterioration of vascular symptomatology, it was decided to perform an arteriography. Due to the reported allergy and renal pathology, CO_2 arteriography was chosen, a procedure that was performed without complications. With the arteriographic findings, without the presence of stenosis requiring revascularization, it was decided to continue with the clinical treatment of the pathology and insisting on the elimination of the smoking habit. ***Conclusions*:** Treatment of Thromboangiitis Obliterans consists of eliminating the smoking habit; however, in patients who cannot meet this criterion due to different circumstances, periodic follow-up is recommended to determine if there is clinical vascular deterioration and, if any, the recommendation is to perform vascular tests. Arteriography is an alternative, although there are patients with allergy to contrast media or renal disease. In these circumstances, the use of CO_2 has become a useful tool due to the few allergic reactions and renal injuries. But there is a disadvantage compared to iodinated contrast mainly because of the image quality.

Keywords: Thromboangiitis Obliterans, Arteriography, CO_2, Follow-up.

INTRODUCTION

Thromboangiitis obliterans or Buerger's disease is a non-atherosclerotic, segmental and inflammatory vaso-occlusive disease that appears mainly in medium and small sized arteries [1, 2]. It occurs mainly in young, smoker men, before 40 years of age. Smoking is the main factor associated with the triggering of this autoimmune process. The prevalence is uncertain due to the absence of specific diagnostic criteria. It is estimated to represent 5% of patients hospitalized due to occlusive arterial disease. Clinically, the most common manifestations are consistent with symptoms of ischemia of the lower extremities, intermittent claudication is the earliest onset sign [3]. An arteriography may be performed as a follow-up method in patients with long-standing disease and persistent symptomatology. With technological development, CO_2 arteriography, approved by the FDA, has become an alternative to that performed with iodinated contrast, especially in patients hypersensitive to iodine or with compromised renal function as in our patient [6, 7]. Regarding treatment, evidence indicates that total abstinence from tobacco is indispensable for symptomatic improvement, and it is also the fundamental point to decrease the progression of the disease and the risk of future amputations [1, 4, 8, 9].

CLINICAL CASE

A 62-year-old patient with a personal history of arterial hypertension, stage III renal disease and thromboangiitis obliterans for 20 years, under pharmacological treatment with Prednisone by the Rheumatology Department and Acetylsalicylic Acid plus Cilostazol by the Vascular Surgery Department. As surgical history he shows amputation of the 1st, 2nd, 3rd and 4th toes of the left foot, lumbar sympathectomy. The patient has a confirmed allergy to iodinated contrast. The reported habits are social drinking and two packs a day of tobacco for the last 40 years.

The patient comes to the control of his disease with symptoms characterized by intermittent claudication with a distance of 200 meters in the left lower limb. He continues with his smoking habit and states that he does not plan to stop. On physical examination, palpation of proximal pulses is normal, distal pulses are not palpable, but they are audible with sound Doppler in both extremities. An arterial ultrasound was performed and it shows proximal arteries with triphasic waveforms without alterations, anterior and posterior tibial artery showing a beaded appearance with color Doppler images and monophasic waveforms. Abundant presence of collateral vessels is observed. Photoplethysmography in left lower limb with flattened waves in the fingers, ABI 0.89, right lower limb with biphasic waveforms in all its trajectory, ABI 0.99.

Due to the progressive deterioration of vascular symptomatology, it was decided to perform an arteriography. Due to the reported allergy and renal pathology, CO_2 arteriography was chosen, a procedure that was performed without complications.

With the arteriographic findings, without the presence of stenosis requiring revascularization, it was decided to continue with the clinical treatment of the pathology and insisting on the elimination of the smoking habit.

Figure 1: CO_2 Arteriography image. Aorta and Iliac Arteries without presence of atherosclerotic plaques

Figure 2: CO_2 Arteriography images. A. Tibioperoneal trunk with CO_2. Decreased flow is observed in the Anterior Tibial Artery. B: Presence of abundant distal collateral network

DISCUSSION

Thromboangiitis obliterans or Buerger's disease is a non-atherosclerotic, segmental and inflammatory vaso-occlusive disease that appears mainly in medium and small sized arteries [1, 2]. The inflammatory involvement of all arterial walls is what makes it be defined as vasculitis [3]. It occurs mainly in young, smoker men, before 40 years of age. Smoking is the main factor associated with the triggering of this autoimmune process; there are 5% of non-smoking patients in whom situations such as frostbite, trauma and the use of sympathomimetic drugs have been identified as possible causes [3].

The prevalence is uncertain due to the absence of specific diagnostic criteria. It is estimated to represent 5% of patients hospitalized due to occlusive arterial disease. Although historically there is predominant influence in men, recent studies show an increase of cases in women due to the increase in smoking among women [3].

Within the pathophysiology it has been observed the existence of endothelial dysfunction in addition to high levels of antibodies against endothelial cells [1, 2]. There is also a hypersensitivity to type I and III collagen [3]. All these components cause histopathological studies to show the presence of occlusive intraluminal thrombi with acute inflammatory infiltration [1, 4].

Clinically, the most common manifestations are consistent with symptoms of ischemia of the lower extremities, intermittent claudication is the earliest onset sign [3]. In its critical phase, there is pain at rest and ischemic ulcers located in fingers or feet, which can be complicated with infections even reaching necrosis and gangrene [1, 2].

The diagnosis of thromboangiitis obliterans is clinical, ruling out the main causes of arterial ischemia. However, there are non-invasive vascular tests that can guide diagnosis, which simulate the records found in occlusive arterial disease of medium and small sized vessels. The ankle-brachial index is reduced and the toe waves in the photoplethysmography are usually flattened [5].

An arteriography may be performed as a follow-up method in patients with long-standing disease and persistent symptomatology. The most common findings, despite not being pathognomonic, can show the stage of the arterial disease. Non-atherosclerotic involvement is usually found mainly in medium and small sized arteries, with segmental occlusive lesions, abundant distal collateral network with a corkscrew shape and absence of calcification of the arterial wall [3, 5].

With technological development, CO_2 arteriography, approved by the FDA, has become an alternative to that performed with iodinated contrast, especially in patients hypersensitive to iodine or with compromised renal function as in our patient. The main advantage is that it does not produce renal damage in addition to its low cost. The most common disadvantage is the image quality. Studies with iodinated contrast tend to generate clearer images especially in distal regions; however, the use of CO_2 is viable and useful in specific cases [6, 7].

Regarding treatment, evidence indicates that total abstinence from tobacco is indispensable for symptomatic improvement, and it is also the fundamental point to decrease the progression of the disease and the risk of future amputations [1, 4, 8, 9]. Intravenous prostacyclin analogues seem to be more effective than oral treatment plus acetylsalicylic acid in terms of disappearance of pain at rest and ulcer healing [4, 5]. Revascularization is rarely effective because vascular damage is diffuse and mainly distal. Sympathectomy is also an option in patients with uncontrollable pain, the latter with variable results [3, 4, 8]. In spite of all the measures, Thromboangiitis Obliterans is considered one of the least treatable vasculitis [5].

CONCLUSIONS

Treatment of Thromboangiitis Obliterans consists of eliminating the smoking habit; however, in patients who cannot meet this criterion due to different circumstances, periodic follow-up is recommended to determine if there is clinical vascular deterioration and, if any, the recommendation is to perform vascular tests. Arteriography is an alternative, although there are patients with allergy to contrast media or renal disease. In these circumstances, the use of CO_2 has become a useful tool due to the few allergic reactions and renal injuries. But there is a disadvantage compared to iodinated contrast mainly because of the image quality. For this reason, the choice of patients to be submitted to CO_2 arteriography must be individualized.

REFERENCES

1. Goiriz-Valdés, R., & Fernández-Herrera, J. (2005). Buerger's disease (thromboangiitis obliterans). *Actas Dermosifiliogr*, 96(9), 553–562. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16476298
2. Olin, J. W., & Shih, A. (2006). Thromboangiitis obliterans (Buerger's disease). *Curr Opin Rheumatol*, 18(1), 18–24. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16344615
3. Puéchal, X., & Fiessinger, J. N. (2007). Thromboangiitis obliterans or Buerger's disease: challenges for the rheumatologist. *Rheumatology*, *46*(2), 192-199.

Available from: http://www.ncbi.nlm.nih.gov/pubmed/17116654

4. Cacione, D. G., Macedo, C. R., do Carmo Novaes, F., & Baptista-Silva, J. C. (2020). Pharmacological treatment for Buerger's disease. *Cochrane Database Syst Rev*, 5(5), CD011033. Available from: http://www.ncbi.nlm.nih.gov/pubmed/32364620
5. Del Conde, I., & Peña, C. (2014). Buerger disease (thromboangiitis obliterans). *Techniques in Vascular and Interventional Radiology*, *17*(4), 234-240. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25770636
6. Díaz, L. P., Pabón, I. P., García, J. A., & de la Cal López, M. A. (2000). Assessment of CO_2 arteriography in arterial occlusive disease of the lower extremities. *Journal of Vascular and Interventional Radiology*, *11*(2), 163-169. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1051044307614602
7. Nobre, C. A., Vieira, W. P., da Rocha, F. E., de Carvalho, J. F., & Rodrigues, C. E. (2014). Clinical, arteriographic and histopathologic analysis of 13 patients with thromboangiitis obliterans and coronary involvement. *Isr Med Assoc J*, *16*(7), 449-453. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25167694
8. Jaroonwanichkul, S., & Hall, J. C. (2023). Decreasing tobacco use promotes ulcer healing in a patient with Buerger's disease. *Clinical Case Reports*, *11*(2), e6999. Available from: https://onlinelibrary.wiley.com/doi/10.1002/ccr3.6999
9. Kawarada, O., Kume, T., Ayabe, S., Nakaya, T., Nakai, M., Nishimura, K., ... & Yasuda, S. (2017). Endovascular therapy outcomes and intravascular ultrasound findings in thromboangiitis obliterans (Buerger's disease). *Journal of Endovascular Therapy*, *24*(4), 504-515. Available from: http://www.ncbi.nlm.nih.gov/pubmed/28743226