

ORIGINAL ARTICLE

# Role of selective intra-arterial embolization in benign liver tumors<sup>☆</sup>



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## KEYWORDS

Therapeutic embolization;  
Arterial embolization;  
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Treatment

## Abstract

**Objective:** To present cases of symptomatic benign liver tumors diagnosed and treated with intra-arterial embolization before surgery.

**Material and methods:** We present the cases of 7 patients diagnosed with symptomatic benign liver tumors that required treatment: 1 focal nodular hyperplasia, 2 giant cavernous hemangiomas, 1 hepatic adenomatosis, and 3 hepatic adenomas.

Once the feeding arteries were identified, tumors were embolized with polyvinyl alcohol particles (500  $\mu\text{m}$ –700  $\mu\text{m}$ ) and then the feeding artery was plugged with coils if there was an arterial pedicle to ensure the total vascular exclusion of the tumor. The surgical intervention took place 4–7 days after embolization.

**Results:** All 7 patients were women (age range, 23–74 years); presurgical intra-arterial embolization was done in 6. In 1 patient with adenomatosis, embolization was done to control intraparenchymal hepatic hemorrhage. In the 6 patients who underwent surgery, the tumor was completely excised and no intraoperative bleeding events or postoperative complications occurred.

**Conclusions:** Provided there is a consensus among the multidisciplinary team, embolization is a useful option in the perioperative management of giant and/or symptomatic benign liver tumors.

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**PALABRAS CLAVE**

Embolización  
terapéutica;  
Embolización  
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Tumor hepático;  
Tratamiento

**Papel de la embolización selectiva intraarterial en los tumores hepáticos benignos****Resumen**

**Objetivo:** Presentar los casos de tumores hepáticos benignos sintomáticos diagnosticados y tratados con embolización intraarterial previa a la cirugía. Describimos la técnica y analizamos los resultados obtenidos.

**Material y métodos:** Presentamos 7 pacientes diagnosticadas de tumores benignos sintomáticos que requirieron tratamiento: 1 hiperplasia nodular focal, 2 hemangiomas cavernosos gigantes, 1 adenomatosis hepática y 3 adenomas hepáticos.

Una vez identificadas las arterias nutricias de cada tumor se embolizaron con partículas de PVA de 500 a 700 micras y posteriormente se cerró la arteria nutricia con coils si presentaban pedículo arterial para asegurar la exclusión vascular total del tumor. La intervención quirúrgica se realizó de 4 a 7 días después de la embolización.

**Resultados:** Los 7 casos eran mujeres con un rango de edad de 23 a 74 años. En 6 pacientes se realizó la embolización intraarterial prequirúrgica. En 1 caso, de adenomatosis, la embolización fue para control de una hemorragia intraparenquimatosa hepática. En las 6 pacientes intervenidas se realizó una exéresis tumoral completa y no tuvieron eventos hemorrágicos intraoperatorios ni ulteriores complicaciones.

**Conclusiones:** La embolización de los tumores hepáticos benignos gigantes y/o sintomáticos es una opción terapéutica útil para el manejo perioperatorio, siempre consensuado en un comité multidisciplinar.

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**Introduction**

Benign liver tumors are usually diagnosed through imaging modalities. Most cases are incidental and symptomatic findings. A percentage of these tumors, especially large tumors, present with pain, hemorrhages, or palpable masses during the abdominal examination. In these cases, management and surgical removal is a recommendation accepted by an experts committee.<sup>1,2</sup>

The selective intra-arterial embolization (SIE) is one therapeutical option that allows us to control the acute bleeding, reduce intraoperative hemorrhages, and in cases of unresectable tumors, it may even control de symptoms.<sup>2-5</sup>

The goal of this study is to present the cases diagnosed and treated in our hospital and analyze the results obtained.

**Material and method**

It is a retrospective study including 5 women diagnosed with symptomatic benign tumors that required treatment (Table 1).

All patients reported abdominal pain, or palpable mass and the first diagnostic approach was through an ultrasound; then their lesions were characterized through computed tomography (CT) scan, or magnetic resonance imaging (MRI) with contrast.

Cases were assessed together by the unit of general surgery, and the unit of radiology and interventional radiology, that decided the course to follow.

Patient#1 shown in the table required a lesion biopsy procedure that was performed percutaneously, and confirmed the diagnosis of focal nodula hyperplasia. In all

the cases presented, intra-arterial embolization procedures were decided prior to the surgery in order to minimize the bleeding and facilitate the removal of the tumor, except for liver adenomatosis that required an urgent intra-arterial embolization procedure due to hypovolemic shock (case 3, Table 1). Approval from the hospital ethics committee was not required since the preoperative embolization is an already accepted technique.

All patients were informed on the procedure and signed a prior informed written consent, except for the patient with adenomatosis whose embolization was performed urgently.

All patients received antibiotic therapy in one single intravenous (IV) dose of 1500 mg of cefuroxime during the surgical act. Conscious sedation was administered through one IV dose of 12 mg of midazolam, one IV dose of 50 mg of pethidine hydrochloride, and one IV dose of 4 mg of ondansetron.

The right common femoral artery was approached with the Seldinger technique using one 4F vascular introducer sheath with hydrophilic guidewire (Terumo Europa<sup>®</sup>, Leuven, Belgium); one 5 F pig-tail catheter was used to perform one abdominal aortography for the assessment of tumor vascularization; and Cobra 2, or Simmons 2 catheters were used to perform one selective arteriography of the arterial branches nurturing the tumor, and once the arterial map was obtained, the artery irrigating the lesion was navigated using the 2.7/2.9F Progreat catheter (Terumo Europa, Leuven, Belgium) with one 0.021 in. hydrophilic guidewire in order to be as selective as possible. Once the nutrient arteries could be identified, they were embolized using 500–700  $\mu$ m polyvinyl alcohol particles (PAP) (Esfera Bead Block<sup>®</sup>, Bio-compatibles UK limited, Survey, UK), and then the nutrient artery was closed using Tornado<sup>®</sup> coils (Cook Medical INC,

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