

# Giant cavernous liver hemangiomas: is it the time to change the size categories?

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**BACKGROUND:** Four different sizes (4, 5, 8 and 10 cm in diameter) can be found in the literature to categorize a liver hemangioma as giant. The present review aims to clarify the appropriateness of the size category “giant” for liver hemangioma.

**DATA SOURCES:** We reviewed the reports on the categorization of hemangioma published between 1970 and 2014. The number of hemangiomas, size criteria, mean and range of hemangioma sizes, and number of asymptomatic and symptomatic patients were investigated in patients aged over 18 years. Liver hemangiomas were divided into four groups: <5.0 cm, 5.0-9.9 cm, 10.0-14.9 cm and  $\geq 15.0$  cm in diameter. Inclusion criteria were noted in 34 articles involving 1972 (43.0%) hemangiomas (>4.0 cm).

**RESULTS:** The patients were divided into the following groups: 154 patients (30.0%) with hemangiomas less than 5.0 cm in diameter (small), 182 (35.5%) between 5.0 cm and 9.9 cm (large), 75 (14.6%) between 10.0 and 14.9 cm (giant), and 102 (19.9%) more than 15.0 cm (enormous). There were 786 (39.9%) asymptomatic patients and 791 (40.1%) symptomatic patients. Indications for surgery related to symptoms were reported in only 75 (3.8%) patients. Operations including 137 non-anatomical resection (12.9%) and 469 enucleation (44.1%) were unclearly related to size and symptoms.

**CONCLUSIONS:** The term “giant” seems to be justified for liver hemangiomas with a diameter of 10 cm. Hemangiomas categorized as “giant” are not indicated for surgery. Surgery should be performed only when other symptoms are apparent.

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**KEY WORDS:** giant hemangioma;  
cavernous hemangioma;  
liver hemangioma

## Introduction

Cavernous liver hemangiomas are described as congenital vascular malformations usually affecting the liver.<sup>[1]</sup> They are the most common benign tumors in the liver, with an incidence of 3%-20% in autopsy series.<sup>[2]</sup> Being small in size and unique, they are usually asymptomatic and discovered incidentally.<sup>[3]</sup> Up to one-third of these tumors can be multiple and a fifth large enough to cause symptoms.<sup>[4]</sup> The right lobe is the most common site. Cavernous liver hemangiomas are approximately five times more common in women,<sup>[5]</sup> most likely due to their hormonal milieu.<sup>[1]</sup> The tumors can be found at any age, although 60%-80% are found in 30- to 50-year-old patients.<sup>[4]</sup>

Liver hemangiomas are conventionally categorized as giant when the diameter is >4 cm.<sup>[6]</sup> This measurement was first reported in 1970 as a limit to categorize this type of tumor as giant.<sup>[7]</sup> However, other sizes were subsequently specified to categorize a liver hemangioma as giant. In 1978, 5 cm was specified for the first time;<sup>[8]</sup> in 1995, a limit of 8 cm was suggested;<sup>[9]</sup> and in 2009, 10 cm was proposed to categorize a liver hemangioma as giant.<sup>[10]</sup> Between these measurements, a limit of 4 cm was the size that was most used to categorize a liver hemangioma as giant.

Proper indications for surgery have been established within the last 50 years with much effort to specify the effective necessity of surgical removal for this tumor.<sup>[11]</sup>

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The giant definition itself and the variations in size categorization have caused serious confusion, especially when justifying a surgical indication for this tumor solely in relation to size. Consequently, the primary aim of this study is to clarify the appropriateness of the size category “giant” for liver hemangioma. As a secondary endpoint, we wish to establish if and when “giant” represents a valid indication for surgery to treat liver hemangioma.

## Methods

### Study selection

Relevant articles in English, Italian and French were extensively searched from the databases of MEDLINE (PubMed), the Cochrane Library, Scopus and Google Scholar. The period of the articles published was between 1970 and 2014. The date of the last search was July 30, 2014. The key words used for the search were “giant hemangioma”, “cavernous hemangioma”, and “liver hemangioma”. These words were used individually or with the Boolean operator “AND”. We collected the articles citing the number of patients over 18 years old, the number of hemangiomas, the size criteria for classification, the mean and range of hemangioma sizes, the number of asymptomatic and symptomatic patients, and the types of symptoms.

### Data extraction

By analyzing the category of giant hemangioma and the mean diameter of liver hemangiomas in the articles, we divided the liver hemangiomas into four groups: <5.0 cm, between 5.0 and 9.9 cm, between 10.0 and 14.9 cm, and  $\geq 15.0$  cm.

Treatments like hepatic resection (HR), transarterial chemoembolization (TACE), and radiofrequency ablation (RFA) were also analyzed. Indications for HR included spontaneous rupture, traumatic or iatrogenic rupture, intratumoral bleeding, Kasabach-Merritt syndrome with abnormal laboratory results (anemia, thrombocytopenia, fibrinolysis, and hypofibrinogenemia), organ, vessel or biliary duct compression, and others. The reported indications were screened to assure a proper correlation between symptoms and the presence of hemangioma.

In accordance with Brisbane’s definition, the extent of resection was divided into right trisectionectomy, left trisectionectomy, right hepatectomy, left hepatectomy, bisectonectomy (including left sectionectomy), segmentectomy, non-anatomical resection and enucleation.<sup>[12]</sup> The extent of resection is related to the size of the resected hemangioma.

Early complications occurred within 30 days after

surgery and were analyzed using the Dindo-Clavien classification.<sup>[13]</sup> When possible, the results of follow-up for the patients who were subjected to resection were reported. Recurrence in the patients who underwent surgery and the increase in size and/or complications in those who were only observed were reported.

## Results

### Literature search

A total of 12 920 articles were searched. After assessment of the abstracts of the articles, 12 886 articles were excluded: 7207 were excluded because other organs were analyzed, 1109 were excluded because hemangiomas <4 cm were analyzed, and 1155 were excluded because animals were analyzed. Of the remaining 3449 articles, 2202 were excluded as case reports, 912 articles had no data, 168 were published in other languages, and 133 articles were relevant to children (Fig. 1).

Ultimately, 34 articles published between 1970 and 2014 described inclusion criteria, and these articles were consequently included in the present study.<sup>[2, 4-7, 10, 14-41]</sup> The articles covered a total of 4587 patients, and 1972 (43.0%) hemangiomas with a diameter greater than 4 cm (Table 1). Moreover, 2615 (57.0%) patients with hemangiomas with a diameter less than 4 cm were excluded in addition to those who had other liver diseases (adenoma, focal nodular hyperplasia, or other types of tumors).<sup>[33]</sup> All articles categorized the hemangioma as giant when it was more than 4, 5 or 10 cm in diameter; the mean diameter of hemangiomas was 13.5 cm with a range of 4-45 cm (Table 1).

### Size category

The new classification was used to classify the hem-

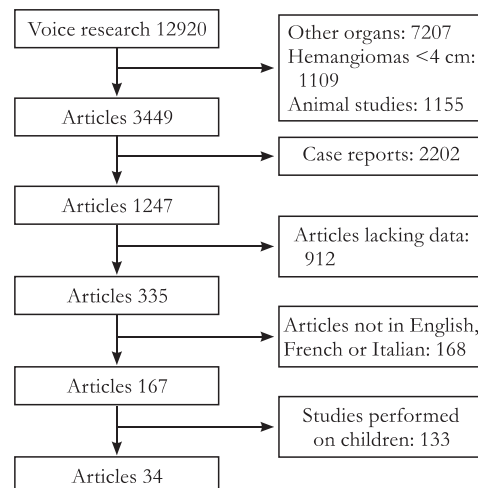


Fig. 1. Flowchart for literature search.

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