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Carbon Dioxide Angiography Is a Standard Technique to Supplement Iodinated Contrast Angiography and Can Be a Feasible Alternative

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We would like to respond to several points brought up in the letter by Dogan et al[1] entitled "Carbon Dioxide Angiography: To be or not to be an alternative?"

Although the authors refer to our study as a randomized trial, our study[2] was (unfortunately) not a randomized controlled trial. Furthermore, they criticize that the frame rate should have been specified for image quality assessment. In fact, the X-ray protocol including frame rates were given (see page 3, line 21-23).

Furthermore, they state that specific equipment is needed. This is only true to a certain degree. Most modern catheterization suites with digital subtraction angiography capability are equipped for CO_2 angiography and basically all catheters can be used. Although an automated CO_2 gas injector is certainly nice and may lead to better images, it can be quite an investment. From our perspective, all it really requires for acceptable results is a laparoscopy grade CO_2 gas bottle with a pressure-lowering valve, standard single-use filters, and a reservoir to hold a certain gas volume; a few hundred Euros. We use the single-use 100-mL Angioset syringes from Optimed (Angioset, Optimed Medizinische Instrumente GmbH, Ettlingen, Germany) that cost as much as a guiding catheter. However, any type of sterile vessel can be used with a 3-way valve.

Dogan et al[1] also state that "this procedure may be very painful and general anesthesia is frequently preferred." We agree that pain may occur following injection causing the patient to move in response leading to less good image quality. However, in our experience, pain only occurs in a fraction of patients and some patients also experience similar pain in response to other contrast agents. We disagree that "general anesthesia is frequently preferred." There may be a difference in the concept of pain in different countries. Dogan et al[1] may like to provide references to support their claim or state their own experience in more detail.

Dogan et al[1] conclude that "CO_2 angiography needs more large-scale studies before its widespread use." Although this technique may not be as widely accepted or accessible in some countries, CO_2 angiography is an established technique known for a long time.[3-5] We argue that in most modern high-volume vascular laboratories in developed countries, this technique can be regarded as a standard technique (with all known limitations) to supplement iodinated contrast angiography. It can even be a feasible alternative for some patients who could not be treated otherwise.

References

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