Spinal infiltration is extremely common in France and, according to an interventional radiology survey conducted by the French society of cardio-vascular imaging (SFICV), 50,000 procedures were carried out by radiologists in 2009–2010. The French Radiology Society (SFR) and the Interventional Radiology Federation (FRI) carried out a review in a session of the 2012 French Radiology Meeting (JFR) on the modification of practices in these procedures following reports about serious neurological complications. An interactive session was proposed during this meeting with 400 radiologists voting electronically.

A group of experts (Hervé Bard, Valérie Bousson, Hervé Deramond, Jean-Luc Drapé, Pierre Guigui, Denis Krausé, Jean-Louis Sautreaux) reviewed the results of voting on the questions asked.

Three preliminary lectures mention serious neurological complications described in France and in the literature following lumbar and cervical spine steroid injections [1–6]. The foraminal approach and operated spine were major risk factors retained due to the possibility of radiculo-medullar arterial effraction [7–9].

In 2011, the French health products safety agency (AFFSAPS) published recommendations about spinal infiltrations, which essentially concerned [10]:

* Corresponding author.
E-mail address: jldrape@gmail.com (J.-L. Drapé).
• information for patients about serious neurological complications;
• decrease use of foraminal approaches in favour of substitute approaches where these are possible;
• limited and caution catheterisation of the distal part of the foramen at a distance from the vessels;
• abandoning the use of IM needles (long bevel) [11];
• systematic verification of the diffusion space by contrast injection prior to infiltration [12–17];
• occurrence of serious neurological complications after a single injection of Hydrocortancyel (Prednisolone acetate), without being able to confirm the causal link;
• avoiding infiltrations of the operated spine as complications have also been reported by interlaminar and posterior articular approach.

We do not have information concerning changes in radiological practice following these recommendations. The audience questioned during this session was carrying out these procedures on a regular basis (71% of them).

The many scientific sessions and refresher courses held during the JFR since 2007, as well as AFFSAPS recommendations, have led to major changes in professional practice over the course of the past five years for 82% of voters.

Giving the patient preliminary information is now common practice among the majority of the audience. Experts have found that clinician colleagues warn patients of potential neurological risks to varying degrees. Warning can be carried out thanks to a preliminary consultation by the interventional radiologist who validates clinical relevance and plans the procedure.

Currently, CT guidance is preferred by 65% of participants; the remaining 34% continue to use fluoroscopy. In fact, 76% have not modified the guidance mode whereas 18% of radiologists have abandoned conventional radiology in favour of CT.

This change reflects a major concern for better guidance. Nevertheless, 7% of voters favoured CT over fluoroscopy, preferring real time control of potential vascular opacification. Experts state that only high-resolution scopy with flat panel detectors are capable of detecting arteriolar opacification.

For lumbar spine procedures, slightly less than half of voters (46%) reported having modified their approach.

In the case of intracanal compression, the foraminal route is probably used less as it is currently only practised by 27% of voters. This is probably due to radiologists used to infiltrate the ganglion in the foramen subjacent to the disco-radicular compression.

The majority (67%) prefers the interlamellar epidural approach. Vascular risk is five times less than of the foraminal route [2,3]. A highly prudent minority prefers posterior articular (8%) or sacro-coccygeal hiatus (1%) injections. In the case of lumbar foraminal compression, the vast majority of voters (77%) continue to use a foraminal infiltration as close as possible to the compression in the foramen. The neurological complications reported have not led to abandon this approach apart from certain teams including those at Lariboisière Hospital.

The same neurological complications are reported after foramen surgery (J.L. Sautreaux, neurosurgeon).

The other interlaminar (14%), posterior articular (8%) and sacro-coccygeal hiatus (4%) approaches appear to be more debatable.

For the operated lumbar spine, the situation is much more complex and the radiologist seems to be hesitant in choosing a particular route. Slightly over one third of voters abstain and doubtless do not practice this procedure. Clinicians are now aware of this risk and request for fewer infiltrations.

While the procedure is still indicated, the participants equally prefer (31%) the interlaminar or posterior articular route. They therefore continue to have a direct route of approach to the operated spine in spite of AFFSAPS recommendations.

Experts emphasize the possible hypervascular nature of the fibrosis and difficulty in locating it precisely. The efficacy of infiltration in this context has not been evaluated but is considered by experts to be lower than that of the non-operated spine.

Infiltration at a distance from the fibrosis is practiced in a third of cases by the sacro-coccygeal hiatus route (21%) or by the subjacent foramen (12%). The efficacy of the sacro-coccygeal hiatus route is poorly assessed in the literature but remains widely used by rheumatologists for non-operated spines.

At the cervical level, 59% of participants did not wish to respond since they used this procedure not at all or very little. Voters have modified their practice slightly more than at the lumbar level (49% versus 46%) while still preferring the foraminal route (54%). The main choice of substitute approach is the posterior articular route (35%) [18,19].

With regard to the needles used, AFFSAPS has raised a potential risk of mixed vascular and epidural positioning, that is increased with long bevel IM needles. The vast majority of the audience (79%) has not changed the type of needle used due to the absence of a consensus on which kind should be used. 10% of the audience prefer using very thin needles (25 G) to limit pain. The risk of puncturing an arteriole is certainly greater than with a larger needle but mixed positioning is less likely. Several participants use 18 G anaesthesia needles with a curved tip and foam with a lateral hole.

Amongst the final questions asked, the role of injecting a contrast medium is considered to be essential for 84% of participants, both with scopy and with CT. Comparison with practices in 2007 shows an 11% increase in contrast injections. The amount of contrast medium injected is higher than 5 years ago for one third of radiologists, probably with the concern of better assessment of the diffusion space. It is important to note that 17% of voters continued to carry out spinal steroid injections without verifying the diffusion space beforehand.

We did not assess any change in the corticosteroids injected over the past years. Nevertheless, acetate of Prednisolone appears to be less used currently (25% of injections), probably as a direct result of the serious neurological complications reported only with this drug. Altim is now the most commonly injected corticosteroid (75% of cases). Adjunction of an anaesthetist remains a minor occurrence (27%) [20]. It is proposed by one of the experts that lidocaine should be injected after a contrast medium in order
to reduce the minor side effects (vagal malaise, flush) of corticosteroid injection, but the absence of an arterial passage should be formally verified.

**KEY POINTS**

- 82% of the participants have modified their practice of spinal steroid injection over the past 5 years.
- The principal change made concerns the approach route (46% lumbar and 49% cervical).
- 11% of participants who did not in the past verify their diffusion space by injection of a contrast medium now carry out this verification. In total, 83% of voters inject contrast medium but 17% continue to infiltrate without any prior opacification.
- The operated spine poses a real problem in terms of management, a third of participants no longer practice infiltration at the operated level. There is no consensus on approach. This is either interlaminar at the operated level on (31%) and posterior articular (31%), or at a distance (adjacent foramen [12%], sacro-coccygeal hiatus [21%]).

**References**


