

**Commentary on:***The Most Influential Publications in Odontoid Fracture Management* by**Donnally et al. *World Neurosurg* 123:41-48, 2019**<https://doi.org/10.1016/j.wneu.2018.11.205>

Perspective on what Seems Simple to Manage: Odontoid Fractures

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I read with great enthusiasm the article written by Donnally et al.,¹ “The Most Influential Publications in Odontoid Fracture Management,” recently published in **WORLD NEUROSURGERY**. Type II odontoid fractures (fractures at the base of the dens axis), after decades of clinical research and development of different surgical strategies are still a management challenge. We are faced with conservative versus surgical treatment, anterior versus posterior approach, and for each approach which surgical technique should be used?

Donnally et al.¹ should be applauded for this thorough research of the medical literature. It gives us a preview of what artificial intelligence, in the near future, will do for us; reviewing in a few seconds the most appropriate literature for a specific problem. When reading the results section, however, it became clear to me that the efforts of these authors would not solve my problem. After scrolling through 394,260 articles pertaining to odontoids, no evidence-based management algorithm can be proposed. This manuscript, once again, urges us to do much more in obtaining some degree of evidence in what can be considered as a well-defined spine problem, the type II odontoid fracture seems to be.

It is worrying to see that even in a well-described pathology with a known pain generator and a clear definition of instability, we fail to create validated guidelines, based on acceptable levels of scientific evidence.

For many non-spine related pathologies, worldwide recognized and accepted treatment algorithms based on high-level evidence are common practice. From all reviewed articles on the odontoid topic, not 1 could be retrieved with a high level of evidence (A or I according to the used grading system).

Are we, neurosurgeons and orthosurgeons dedicated to the spine, bad clinical scientists? How long will we be paid for executing spine surgery with very weak, if any, scientific justification?

I am rather in favor of giving us some credit. In most spine pathologies, one of the main clinical parameters we measure is pain. Pain is an emotion, and, as such, highly influenced by bio-psychosocial and cultural factors. We are just at the beginning of the unraveling of this complex emotion. If pain is one of the key parameters when performing clinical studies on spine problems, it is obvious that obtaining evidence is not easy. Pain is the most important parameter for our patients, but for us it is hardly measurable. Besides the ‘pain’ issue, other factors are to be considered. One of the conditions necessary when targeting a high level clinical trial is the comparison to placebo. However, there is no placebo nor sham procedure for spine surgery. Furthermore, in many pain conditions attributed to the spine, we are not able to identify a unique pain generator. In chronic non-specific (no red flags) low back pain, in most cases, the origin of the pain is unknown; it is beyond our detection level. It might, therefore, be possible that, in a comparative study between 2 surgical techniques, we compare apples to oranges. No wonder the result is not very significant. Finally, in some cases, as in instable type II odontoid fractures, there is the inability of safely randomize a patient for conservative treatment versus surgical management. It is evident that a randomized control trial between conservative and surgical treatment in this condition will not be accepted.

For these reasons, we will have to run most of our daily spine practice, even after the introduction of artificial intelligence, without algorithms based on high-level evidence. It will become

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important to convince governments and insurance companies that, for the reasons outlined earlier, we, spine surgeons, cannot provide level I evidence for most conditions. In an era in which there is a tendency not to pay for care if there is no high level of evidence, we must make our point.

Meanwhile, every effort should be made to conduct high level clinical research, especially in well-described pathologies such as type II odontoid fractures. Although the diagnosis may be clear, the setting of such a study is not. All type II fractures are different (vascular supply, bone quality, etc.) The one patient is not the same as the other, and, finally, one surgeon is more experienced than the other. If we can randomize 2 patient cohorts with correction for all these factors, which is an immense effort if even possible, we would probably fail to take into consideration many other factors that are still unknown to us.

Are we bad health care providers if we cannot offer the best treatment proposal based on high-level evidence?

Spine surgeons must consider much more than just levels of evidence. For every patient with a spine problem, we must deal with 4 points:

1. the care demand of the patient
2. the objective need for care
3. the possible treatment strategies
4. the treatment expectations (of the patient).

CARE DEMAND

In cases of type II odontoid fractures, some of these issues seem simple. Most of these fractures are posttraumatic and occur in older people. They are admitted to a hospital, have neck pain and a rigid annoying collar. Neurologic signs and symptoms are extremely rare. These patients want us to treat their pain and to remove the stiff collar. This is a clear demand for care. "Curiosity and Listening,"² the Editor's Letter published in *World Neurosurgery* November 2018 issue, addresses this issue very clearly in a few words.

OBJECTIVE NEED FOR CARE

The objective need for care is not so difficult. A computed tomography scan shows the type of fracture. The key point in all 3 types of odontoid fracture is the presence/absence of instability. This can be estimated on a computed tomography scan, proven on dynamic x-rays (for the brave ones). In case of doubt and/or

neurologic injury, magnetic resonance imaging can provide extra information (i.e., regarding an intact transverse ligament).

TREATMENT STRATEGIES

In cases in which no evident instability can be demonstrated, a conservative treatment can be considered. There is no evidence, however, that, for this indication, a halo vest yields better results than a rigid collar (both disliked by the patient). In cases of obvious instability, there is an objective need for surgical care. The aim is to provide a stable segment (fusion) and to reduce the neck pain. Because of the capacious nature of the spinal canal at the C1-C2 level, odontoid fractures are rarely associated with an acute neurologic deficit. In the setting of chronic instability due to non-union, late onset myelopathy has been observed. In these cases, a posterior (decompression) fixation is the best option.

For conservative care as well as surgical care, the different treatment options should be discussed with the patient, but their condition is mandatory to include in this decision process. It is well known that in spine surgery, the complication rate is mainly influenced by the condition of the patient (such as age, ASA-score, comorbidity, and smoking). The rate of revision surgery and early re-admission to the hospital is mostly related to the skills of the surgeon.

To make the best decision, all of this should be discussed with the patient and/or family. C1-C2 posterior fixation are good surgical techniques, but seem more incapacitating than anterior odontoid screw(s), and the debate regarding the mortality/morbidity of a halo-vest for this condition is not in its final phase.

TREATMENT EXPECTATIONS

After considering all the benefits and risks, one must deal with the often unrealistic expectations of the patient. If expectations cannot be aligned, an alternative strategy may be in order. "If you understand that neck pain may not be resolved with this treatment, are you OK with proceeding to address the possible (very rare) life threatening condition?" By optimizing expectation management, we can improve both patient and surgeon satisfaction.

I am convinced that, if we, as surgeons dedicated to the spine, train for excellent surgical skills and take into consideration all of the previously mentioned conditions, we offer our patients in particular, but the society in general a better quality of medical care, as compared to decision making only based on algorithms. In these conditions we are worth the money.

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