

# Differential treatments for osteoid osteoma: comparing surgical to non-surgical and radiofrequency approaches

## Abstract

Osteoid osteoma is a slow growing, benign bone tumour that usually develops in long bones such as the femur or tibia during the second or third decades of life. Its slow growing, benign nature, means that it does not spread throughout the body and therefore has lower risk of future complications. This characteristic of non-metastasising allows varied approaches in terms of treating and management the tumour, these being either an invasive approach where the entire tumour is removed through surgery or radiofrequency ablation or a non-surgical approach where pain is managed with an expectation that the tumour will reduce in size. This article will aim to collect and process information outlining the variance in when and why specific treatment types should be used by health professionals.

**Keywords:** osteoid osteoma, radiofrequency ablation

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## Introduction

The growth of osteoid osteomas is well understood and documented within medical literature since being mentioned by H. Jaffe in 1935.<sup>1</sup> Since 1935 there has been a number of steps taken to help broaden the general understanding of the disease and the best ways to manage it.<sup>2</sup> Management and treatment of osteoid osteoma currently consists of one of three commonly used methods: 1) radiofrequency ablation, where the lesion is located and marked through the use of a CT before having electrodes placed directly onto the bone and thermal ablation applied,<sup>3</sup> 2) complete surgical removal of the tumour with a particular focus of removing all of the central core, or 3) allowing the body to spontaneously self-healing with pain management.<sup>2</sup> Each of these treatment methods have their own advantages and disadvantages depending on the individual and their case's relevant factors. These factors include the way in which the patient responds to nonsteroidal anti-inflammatory drugs and other pain reducing drugs, the cosmetic appearance of the tumour and the patients desire to have it removed, the location and impact of the tumour on other systems and the general health of the patient.<sup>4</sup> This article will firstly analyse the specific strengths and weakness of each treatment method and secondly how these factors impact the patient and alter their choice and recommended treatment method.

Surgical removal is considered to be the most invasive treatment method of the three, usually involving the entire tumour to be scoped or scraped out from the bone. The advantage of this method is the time taken to remove the tumour and achieve pain free status, this being complete pain free status occurring almost immediately after surgery.<sup>5</sup> The most pressing disadvantages of this method are the likelihood of the primary surgery being unsuccessful and the possibility of future bone defects due to the large amounts of osseous tissue removed. On average, this method is only 80 percent successful after primary removal of the tumour.<sup>6</sup> This method is mainly used in cases where the patient is non-responsive to pain management, the tumour is easily accessible or in cases where the patient wishes to have the tumour removed.<sup>7</sup>

Radiofrequency ablation is a relatively new treatment method for dealing with osteoid osteomas and is used in very similar cases as surgical removal. This method is considered to be less invasive, as it uses a guided probe, limiting the amount of bone being destroyed, allowing the procedure to be completed quickly and the patient return home soon after.<sup>8</sup> When this method is compared against surgical removal there a very few disadvantages; ablation having higher success rates, fewer complications and faster recovery times.<sup>6</sup> As the risks of complications are lower and the success rates are higher for anyone opting for a surgical interventional procedure should have ablation as their preferred treatment method.

Spontaneous self-healing or medical management is the process of managing pain and other related symptoms while allowing the patient's body to destroy the tumour and remove the excess osteoid bone. This method is the least invasive of the three and is suitable for anyone unwilling or unable to undergo any surgical methods due to any illnesses, poor health or personal preference.<sup>2</sup> It also is the only method suitable for treating tumours which arise in areas such as the vertebral column, where surgery may be too risky to perform or will require excessive grafting.<sup>9</sup> The disadvantages for this treatment however are not insignificant; pain management alone can be difficult with some people being unable to control the pain due to other system side effects or antagonistic drug interactions. This method also takes place over many years with a generally lower success rate, a complete removal of the tumour, compared to the other methods mentioned.<sup>2</sup> Although this method has a low removal rate, it can still be considered an endpoint treatment method as it is able to provide extended pain relief and reduction of tumour size.

In terms of the likely prognoses or outcomes for patients, each method of treatment is likely to end up with the tumour reducing in size and in a large amount of cases being completely removed. Out of the three methods mention above, the treatment with the best prognosis is the radiofrequency ablation, which has a primary success rate over 90 percent and a secondary rate greater than 95 percent.<sup>8</sup> Following was surgical removal which had a fluctuating outcome rate depending on

the type of surgical incision, mini-incision surgery being much more effective than an open excision, but still less effective overall when compared against radiofrequency ablation (Yang, Chen, Wang, & Chen, 2008). The least effective at removing the tumour was through medical management. Although successful in more than half of all patients, the treatment is very time consuming and still less successful than either of the surgical interventional procedures (Table 1).<sup>2,10</sup>

**Table 1** Graphical depiction of references

Year of publication	Authors	Approach
2015	Cakar <sup>3</sup>	Radiofrequency ablation
2014	Ahmad et al. <sup>9</sup>	Surgical
2009	Jankharia et al. <sup>8</sup>	Radiofrequency ablation
2008	Yang et al. <sup>6</sup>	Surgical
2002	Ilyas et al. <sup>2</sup>	Non-surgical
1999	Companacci et al. <sup>5</sup>	Surgical
1997	Bullough <sup>4</sup>	Non-surgical
1992	Kneisl et al. <sup>10</sup>	Non-surgical
1990	Voto et al. <sup>7</sup>	Tomography
1935	Jaffe <sup>1</sup>	Surgical

## Conclusion

In regards to providing the best medical treatment to all patients, doctors must take into account all relevant factors associated to an osteoid osteoma bone tumour. The most crucial and in a majority of cases, a differentiating factor between the use of either radiofrequency ablation or spontaneous self-healing, was the ability for the doctor and patient to manage the pain and patients desire to have it removed. These two factors, relating directly to the patient's ability to live with the tumour over an extended period-of-time, need to be considered by health professionals.

## Acknowledgements

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## Conflict of interest

The author declares no conflict of interest.

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