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Differences in Pain, Happiness, and Global Functioning Scores in Patients with OI Between Pamidronate and Zoledronate

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Introduction

Osteogenesis imperfecta (OI) is a heritable skeletal dysplasia that affects approximately 1 in 10,000-20,000 births (Lim et al., 2017). Approximately ninety percent of OI cases are due to Type I collagen mutations. The disorder is broken down into types, with Type I-IV being autosomal dominant and Type VI-XIII being autosomal recessive. Bisphosphonates, particularly pamidronate and zoledronate, are the mainstay treatment of the symptoms of OI. At many institutions, the choice of whether to prescribe pamidronate or zoledronate is largely dependent upon the provider and patient comfort (Garganta et al., 2018). Bisphosphonate therapy is typically initiated in mild to moderately severe patients when children with OI have two fragility fractures per year (Garganta et al., 2018). Current studies demonstrate that bisphosphonate therapy relieves bone pain acutely following infusion in children with OI but stop short of commenting on the duration of the relief and if there is any long-term reduction in pain. Although long-bone fractures still occur in moderate or severely affected patients on bisphosphonate therapy, IV bisphosphonate treatment can improve mobility, especially when started early in life (Dwan et al., 2016). However, the current literature lacks studies that investigate the global functional status of children on long-term IV bisphosphonate therapy, both as a snapshot in time and longitudinally as the children mature.

The purpose of this study is to provide a snapshot of happiness, comfort, and global functioning scores of a population of pediatric patients with Type III or Type IV Osteogenesis Imperfecta on long-term IV bisphosphonate therapy, namely pamidronate and zoledronate. In addition, this study will investigate whether those scores are significantly increased for patients on pamidronate versus those on zoledronate therapy.

Hypothesis

The long-term use of pamidronate over zoledronate is associated with lower pain scores and higher happiness scores and global functioning scores in patient with Type III or Type IV OI.

Analytical Methods

Critical data includes: OI type, gender, drug, dose, age of first infusion, frequency of dose, parent- reported Pediatric Outcomes Data Collection Instrument [PODCI] data: pain scores, comfort scores, happiness scores, global functioning scales

The treatment noted on the visit closest to when a patient was 11 years of age was determined. The closest visit for each patient was only included if the patient was within +/- 2 years of 11 years of age on their treatment note date. PODCI data associated with a visit that was closest to the treatment note date, but had to be within +/- 1 years of the treatment note date, was linked to the treatment data.

Descriptive statistics for PODCI scores are given as medians and interquartile ranges (IQRs, representing the range of the middle 50% of the data). Wilcoxon Rank Sum tests were used to examine differences in PODCI scores between treatment groups. All analyses were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

Pain Scores

Drug	N	Median	IQR
Pamidronate	20	56.1	50.8;71.9
Zoledronate	6	86.1	75.6;93.3

For patients around 10 years old, those who were on zoledronate had statistically higher pain scores than those on pamidronate, with a p-value of 0.0085.

Global Functioning

Drug	N	Median	IQR
Pamidronate	20	61	53.2;76.8
Zoledronate	6	79.9	71;86.5

There was a significant difference in global functioning scores between patients on pamidronate and zoledronate but not at the p=0.05 level; there was a p-value of 0.0828.

Happiness

Drug	N	Median	IQR
Pamidronate	20	75	50;95
Zoledronate	6	65	55;80

There was no statistically significant difference in happiness scores compared to those on zoledronate, with a p-value of 0.4634.

Conclusion and Future Directions

- Our study begins to explore differences in pain, happiness, and global functioning as measured in PODCI between the pamidronate and zoledrone in a small sample of 11 year old patients with type III or type IV OI.
- There are a statistically significant higher pain scores in patients taking zoledronate compared those on pamidronate.
- However, since this was not a randomized control trial, we cannot say that zoledronate caused pain as most patients begun their bisphosphonate therapy on pamidronate and switched to zoledronate for reasons such as increased pain, fractures, or decreased in bone mineral density (BMD).
- From a statistical standpoint, we cannot conclude that they are both good, rather, we didn't find evidence that one was superior/inferior to the other.
- Limitations of our study include small sample size, nonrandomized control trials, and the patients on zoledronate had started treatment on pamidronate. Future studies are needed to further assess patient reported psychological and global functioning outcomes in OI.

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