

# In Save: Applications of Manual osteoperforation

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Dr. R. Bruce McFarlane is a 1984 dental graduate of the University of Manitoba and holds a master's degree in orthodontics from the University of Western Ontario.



He has since had practices in Winnipeg, Kenora, and Thunder Bay, Canada, as well as Beverly Hills, California. He travels and teaches extensively for Align Technology, Henry Schein Orthodontics and Propel Orthodontics. In his spare time, he enjoys fitness, technology and philanthropy.

Manual osteoperforation (MOP) is a well-established method of orthodontic acceleration. It can be used in a proactive or reactive role as an orthodontic case is executed. This article focuses on the latter application, calling in MOP to speed up or “save” cases already in progress.

Since the publication of the original research on manual osteoperforation performed at New York University,<sup>1</sup> the clinical application and acceptance by practitioners of the system has grown significantly.<sup>2</sup> It has proven to be useful in both proactive and reactive clinical applications for orthodontic cases being treated with fixed brackets or clear aligners. The reactive application is especially interesting to me, because it can put an orthodontic case back on track toward a more successful and expedited conclusion, thus saving time, money and reputations.

## Educational objectives

At the end of this program, participants will be able to:

1. Understand the difference between proactive and reactive use of manual osteoperforation (MOP)
2. Know which orthodontic movements are commonly involved in making a case lag
3. Understand the targeted use of MOP for specific areas, and anchorage requirements
4. Appreciate the efficiency, economic and reputation-saving advantages of MOP
5. Feel confident about when, where and how to apply MOP in a reactive role



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## Introduction

Manual osteoperforation is a scientifically proven<sup>1</sup> method of orthodontic acceleration, with a good track record of success in my practice and the orthodontic community as a whole.

There is demand for it. By far the most common question faced daily by orthodontists is, “How much longer do I have?”

In the MOP world, we speak of two approaches for the use of the system:

- *Proactive.* The use of the MOP device is planned for, premeditated and factored in to the original orthodontic treatment plan.
- *Reactive.* MOP is added to an orthodontic treatment course that’s already underway.

This article will focus on the latter.

With all of the recent improvements and optimization in orthodontic force-delivery technology, attention is now being paid to orthodontic acceleration via direct stimulation on a cellular level.

MOP is one such approach used in my practice. The technique involves making small perforations through the mucosa and into the bone, near the roots of teeth that are to be accelerated (Fig. 1, p. 67). This minor injury causes a local area of inflammation that recruits a cytokine cascade and, ultimately, osteoclasts to accelerate the rate of tooth movement. Perforation has a radius of response that extends beyond the perforation site. While each patient’s biology is unique, I typically allow three months for the biological response to express before assessing the need for additional perforations.

I use MOP with any age group, but I find it’s especially useful in older adolescents and adults, because the cellular activity necessary to move teeth isn’t as prevalent in them as it is in a child.

Certain orthodontic movements are slower and more difficult than others. These can include, but are not limited to:

- Space closure
- Guiding in ectopic or impacted teeth
- Unraveling very crowded teeth
- Uprighting
- Derotation
- Expansion

Historically, when faced with particularly slow or difficult movements, practitioners could turn to invasive procedures such as corticotomy and luxation, or simply wait it out.

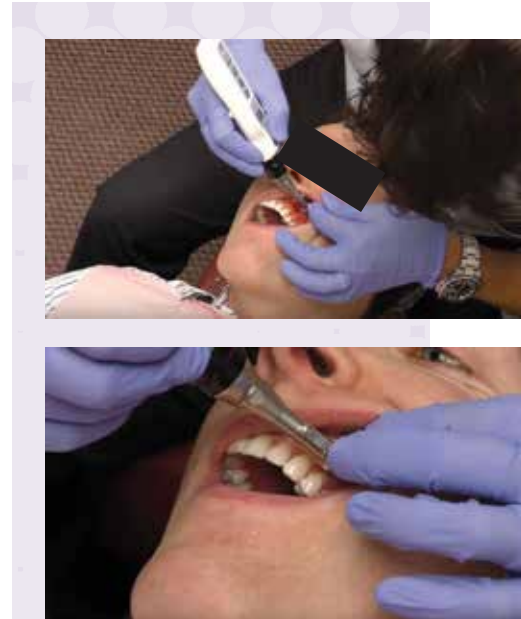
The advent of manual osteoperforation technology has given us a less invasive method of speeding up slow movements.

In many cases it’s the patient or parent who acts as the catalyst, by expressing impatience and asking midtreatment if there’s a way to move things along. It’s often these inquiries that prompt the discussion about reactive application of MOP.

## Manual osteoperforation treatment

The MOP treatment is simple in nature, bringing yet another benefit to my practice. In a reactive case, we identify the rate-limiting movements and determine our perforation sites accordingly.

The patient is anesthetized and we perform manual osteoperforation. For 24–48 hours after the procedure, patients



The MOP procedure.

### Disclosure:

This article may describe uses of osteo perforation in general and/or an Excellerator™ series driver specifically that have not received 510(k) clearance or premarket approval from FDA. Propel Orthodontics provided financial support to the author.

may experience some tenderness around the treatment site.

This sensitivity is similar to that of an orthodontic adjustment. NSAIDs should be avoided, because they inhibit orthodontic movement. Any discomfort should be treated with acetaminophen.

The drivers used to perform this treatment have evolved to provide a suitable option for each clinician. There is a single-use option as well as reusable driver options (Fig. 1), which include a manual driver and a new power driver, both with removable tips.

I often use the second-generation manual driver with removable tips for reactive cases; the tip construction remains the same through each generation, allowing for optimal efficacy when creating these perforations,

so clinicians are free to choose the driver option that best fits their practice.

MOP can be applied to orthodontic movement, no matter how it is delivered—via fixed, removable or clear-aligner devices. In the latter, I've found that MOP can often contribute to recapturing the "tracking" of the devices, thus preventing a case refinement or midcourse correction.

In addition, it can shorten aligner intervals: Many of my peers have been able to show success with 10-day, seven-day and even three-day aligner changes with the system.

### Manual osteoperforation benefits

One of the advantages of MOP over

other methods of orthodontic acceleration is that it can be targeted to the area of most need. Often, it's only a single tooth or quadrant that's the holdup; manual osteoperforation can be applied to specific areas. This concept also has ramifications for anchorage planning—one can provide the stimulation in the direction of the desired tooth movement, and not in another direction.

I've found that the tangible advantage of reactive use of MOP is to move the case along, thus finishing sooner, with fewer visits and more profitability per visit. Perhaps less tangible but just as important is the patient-satisfaction aspect: One can speed up the difficult movements, keep on-time promises and save reputations!



Fig. 2

### Case 1: Exposed canine

A 26-year-old patient came to the office for comprehensive orthodontic treatment (Fig. 2). Intraoral examination revealed a Class I crowded malocclusion with a retained upper left deciduous canine (Fig. 3).

Radiographic examination revealed an impacted upper left permanent canine (Figs. 4 & 5). After six months of fixed orthodontic treatment, the upper left canine



Fig. 3

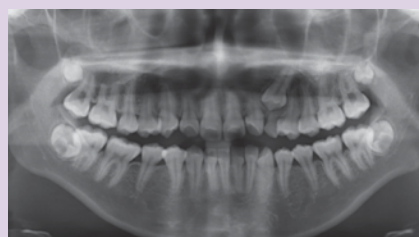


Fig. 4



Fig. 5

was surgically exposed but was not moving easily. The idea of manual osteoperforation was presented to the patient then, and no extra fee was charged. (In fact, none of the



Fig. 6. Initial perforations



Fig. 7. Four weeks after perforations



Fig. 8. Eight weeks after perforations

cases presented here included an extra fee.) MOP was applied to the area (Fig. 6), and after four weeks the impacted tooth showed significant movement (Fig. 7).



Fig. 1. Treatment performed with reusable manual driver

Overall, MOP is similar to a “closer” in baseball in its ability to “make the save” when a particular orthodontic case is lagging. It’s also one of the least expensive orthodontic acceleration devices, and many fee guides have a fee code and value for the procedure whether or not it’s charged for separately. We’re all aware of the economics of overall shorter treatment times!

Manual osteoperforation involves making small perforations in the bone. This causes a local area of inflammation that recruits a cytokine cascade and, ultimately, osteoclasts to accelerate the rate of tooth movement.

The following cases illustrate the concept of reactively incorporating the MOP system to speed up and put difficult cases back on track, thus saving time, money and reputations.

### Conclusion

MOP is a useful, effective, and economic solution to troublesome tooth movements that show up as an orthodontic case is treated

out. It is an excellent pitcher to call to the mound for the “save.” ■

### References

1. Alikhani M, Raptis M, Zoldan B, Sangsuwon C, Lee YB, Alyami B, Corpodian C, Barrera LM, Alansari S, Khoo E, Teixeira C. Effect of manual osteoperforations on the rate of tooth movement. *Am J Orthod Dentofacial Orthop.* 2013 April; Volume 4 No 3, 56-57.
2. Guinn, K: Propel orthodontics enabling faster and more predictable results. *OrthoTown: December 2013*

### Case 2: Large space closure

A 62-year-old patient asked that we close an edentulous space in her lower left quadrant (Figs. 9 & 10). Lingual upper and labial lower brackets were bonded, and it was decided that a temporary anchorage device would be used as the main anchor for mesial movement of the lower left second and third molar (Fig. 11).

At the time of the initiation of space closure, the question was posed: “Any way to speed this up?” Of course, the answer was “yes.”

As the space closure was initiated, MOP was performed, and three months later the space had closed significantly (Fig. 12). Subsequent examinations revealed further closure (Figs. 13 & 14).



Fig. 9



Fig. 12

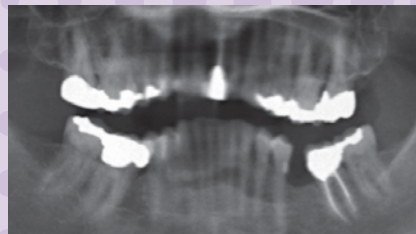


Fig. 10



Fig. 13. At four months

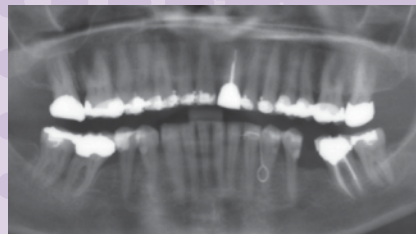


Fig. 11



Fig. 14. At six months the space is closed.

### Case 3: Stubborn lower incisors in a deep bite

The 37-year-old patient had a deep bite and crowded and worn lower incisors (Figs. 15–18). At four months, the lower incisors were not moving well. MOP was explained and the patient was keen to proceed (Fig. 19). After four weeks, the lower incisors had

unraveled nicely (Fig. 20). At eight weeks, the lower incisors were straight (Fig. 21).

Interestingly, the areas around the lower premolar and molar teeth were not perforated, and the difference is clear. (In retrospect, the entire lower arch should have received perforations.)



Fig. 15



Fig. 16



Fig. 17



Fig. 18



Fig. 19



Fig. 20



Fig. 21



Fig. 22

**Case 4: Reactive manual osteoperforation in a clear aligner case**

A 49-year-old patient with a Class I crowded malocclusion requested clear aligner therapy (Figs. 22–25). Six months into clear aligners, the upper right canine stopped tracking. There was a discussion about midcourse correction, but instead, manual osteoperforation and IPR were utilized (Fig. 26). Eight weeks later, with subsequent aligners changed every two weeks, the canine was back on track without auxiliaries or midcourse correction (Fig. 27).



Fig. 25



Fig. 23



Fig. 24



Fig. 26



Fig. 27

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- 1) **The proteins that are vital to the effectiveness of manual osteoperforation (MOP) are called:**
  - A) Macrophages
  - B) Cytokines
  - C) Leukocytes
  - D) Melanocytes
- 2) **Manual osteoperforation treatment can be used on:**
  - A) Adolescents
  - B) Adults under 30
  - C) Adults over 30
  - D) Any age group
- 3) **Patients may experience some tenderness around the treatment site for:**
  - A) 24–48 hours
  - B) 2–3 days
  - C) 7–10 days
  - D) Up to 30 days
- 4) **Local infiltration anesthesia must be used with MOP:**
  - A) True
  - B) False
- 5) **A decrease in the effectiveness of MOP would come from concomitant use of:**
  - A) NSAIDs
  - B) Acetaminophen
  - C) Penicillin
  - D) Diazepam
- 6) **The patient in Case 4 presented with:**
  - A) Impacted canines
  - B) Deep bite
  - C) Severe crowding
  - D) Exposed canine
- 7) **There is an upward age limit to the use of MOP.**
  - A) True
  - B) False
- 8) **Other orthodontic acceleration techniques include:**
  - A) Vibration
  - B) Corticotomy
  - C) A and B
  - D) None of the above
- 9) **MOP can be applied to:**
  - A) The entire dentition
  - B) Specific targeted areas
  - C) A and B
  - D) None of the above
- 10) **MOP can be appropriately used:**
  - A) Only proactively
  - B) On a wide variety of malocclusions being treated with braces or aligners
  - C) Only on adults
  - D) On a patient with advanced periodontal disease

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**In for the Save: Applications of manual osteoperforation**

by Dr. R. Bruce McFarlane

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| 5. COURSE OBJECTIVE #3 was adequately addressed and achieved                         | 5 | 4 | 3 | 2 | 1 |
| 6. COURSE OBJECTIVE #4 was adequately addressed and achieved                         | 5 | 4 | 3 | 2 | 1 |
| 7. COURSE OBJECTIVE #5 was adequately addressed and achieved                         | 5 | 4 | 3 | 2 | 1 |
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| 9. Instructor demonstrated a comprehensive knowledge of the subject                  | 5 | 4 | 3 | 2 | 1 |
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