Dental Research Journal

Case Report

Persistence of postoperative pain due to extrusion of endodontic obturator plastic carrier: A report of two cases treated with a periradicular microsurgical approach

Silvio Taschieri[1,2], Gianluca Gambarini[3], Irina Makeeva[4], Svetlana Tarasenko[5], Stefano Corbella[1,2,5]

[1]Department of Biomedical Surgical and Dental Sciences, Università degli Studi di Milano, [2]Dental Clinic, IRCCS Istituto Ortopedico Galeazzi, Milan, [3]Department of Dental and Maxillofacial Sciences, Università Sapienza di Roma, Rome, Italy, Departments of [4]Therapeutic Dentistry and [5]Oral Surgery, Institute of Dentistry, I. M. Sechenov First Moscow State Medical University, Moscow, Russia

ABSTRACT

The aim of the present study was to describe two clinical cases showing postoperative pain associated with the use of plastic carrier obturation system and apical bone fenestration. The patients were treated by surgical access and apicoectomy through a modern technique (using magnification and microsurgical approach), thus removing the direct contact between obturation material and submucosal connective tissue. The surgical interventions were carried on without the occurrence of any complication. Postsurgical adverse sequelae were negligible. After few weeks from the surgery, all symptoms disappeared. Radiographic healing was observed after 48 months. The presence of apical bone fenestration could be the cause of persistent pain after root canal treatment. The contact between plastic carrier and submucosal connective tissue could be the direct cause of spontaneous pain even in absence of periapical infection. Since the clinical diagnosis could be difficult, the use of tridimensional radiology could be justified. Surgical approach, by the removal of the contact between the carrier and connective tissues, can be considered a viable option to treat these particular affections.

Key Words: Apicoectomy, endodontics, pain, root canal obturation

Received: 13-Sep-2019
Revised: 26-Feb-2020
Accepted: 05-Mar-2020
Published: 24-May-2021

Address for correspondence:
Dr. Stefano Corbella, IRCCS Istituto Ortopedico Galeazzi, Via R. Galeazzi, 4, 20161 Milan, Italy.
E-mail: stefano.corbella@gmail.com

INTRODUCTION

The main aim of endodontic treatment is to allow the long-term retention of teeth affected by pulpal or periradicular pathology in the absence of signs and symptoms.[1,2] This could be obtained through the tridimensional filling and sealing of the root canal system after removal and isolation of microorganisms and pulp debris.[3,4]

Many techniques, instruments, and materials were described in scientific literature to effectively fill root canal space.[3,4] Gutta-percha, both thermoplasticized and cold, is commonly used in various techniques for obtaining tridimensional sealing of the root canal system.[2,5,6] Plastic carriers coated with gutta-percha are also widely used.[4] Other materials, such as resin cement[4] and mineral trioxide aggregate,[7-9] were adopted for apical and canal obturation with specific clinical indications.

Access this article online

Website: www.drj.ir
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www.ncbi.nlm.nih.gov/pmc/journals/1480

How to cite this article: Taschieri S, Gambarini G, Makeeva I, Tarasenko S, Corbella S. Persistence of postoperative pain due to extrusion of endodontic obturator plastic carrier: A report of two cases treated with a periradicular microsurgical approach. Dent Res J 2021;18:34.

Since ideally, the obturation material should remain confined in the root canal space, sometimes it can extrude in the periradicular area, thus provoking, in some cases, postoperative pain and discomfort.[10] Among the causes of the worsening of postoperative quality of life after extrusion of endodontic obturation materials, we can cite the inflammatory response of the periapical tissue that can cause persistent pain and postoperative flare-up.[11,12] The extrusion of obturation material and/or endodontic sealant in the presence of particular anatomical structures, such as neurovascular bundles and periosteum, could cause significant pain.[10]

From the anatomical point of view, postoperative pain can occur after root canal treatment in the presence of apical bone fenestrations located on the buccal side of alveolar bone. In this particular situation, overfilling and extrusion of obturation material could be related to mucosal (and periosteal) irritation and consequent inflammation that cause persistent pain after treatment.[13]

In some cases, the occurrence of postoperative persisting pain could require further intervention, through a surgical approach, after a failed orthograde nonsurgical approach.

The aim of the present study was to present two cases of postoperative acute pain after orthograde endodontic treatment probably due to the extrusion of gutta-percha and/or carrier and its contact with surrounding connective tissues that were treated by a surgical approach.

CASE REPORTS

Two patients were referred to the Dental Clinic of IRCCS Istituto Ortopedico Galeazzi in Milan, Italy. Both the patients were informed about the treatment options and signed a written informed consent form before the intervention.

Case report 1

A 54-year-old male, classified as the American Society of Anesthesiologists physical status 1 (ASA I), complained of spontaneous pain in the second right maxillary molar (#1.7) region and a slight complaint in the same area while chewing. The pain was constant and exacerbated by finger pressure in the apical area from the buccal side. The #1.7 presented with no mobility, and it was periodontally healthy. Primary orthograde endodontic treatment was performed 6 months before.

Periapical radiographs revealed the absence of periapical lesion and a physiological periodontal ligament space [Figure 1]. Moreover, the previous endodontic treatment performed 1 year ago, appeared, at radiographic examination, adequate. The patient reported that pain occurred 1 week after the endodontic treatment. In order to acquire more information, it was decided to request a cone-beam computed tomography (CBCT) of the area, finding no sign of apical extrusion of obturation material and a buccal bone fenestration with the apex of the distal root outside of the buccal plate and the curved mesial root that was close to the distal. A small periapical radiolucency could be observed at the apex of the distal root [Figure 2].

On the basis of signs and symptoms, the preliminary clinical hypothesis was of an apical longitudinal root fracture or of an extraradicular inflammation. After informing the patient, who signed a written informed consent form, it was decided to perform an exploratory flap in order to complete the diagnosis. Preoperatively, the patient was fully informed about the surgical protocol and clinical alternatives. The patient rinsed his mouth with an antiseptic mouthwash containing 0.2% chlorhexidine digluconate, beginning 3 days before surgery.

The access flap was triangular, with one horizontal incision and one vertical incision, with the latter located mesial to tooth #1.4. A papilla base incision (PBI) approach was adopted, as described by Velvart.[14] Magnifying surgical loupes (×4.3) were used for better visualization during flap design and elevation. Following flap elevation, the presence of

Figure 1: Periapical radiograph of the #1.7 showing the presence of a periapical radiolucency.

a capsulated lesion near the tooth apex was evident. After a careful removal of the inflammatory lesion, out of the mesiobuccal root apex, more than 1 mm of the plastic carrier used for the obturation was clearly visible [Figure 3]. Due to the anatomical morphology of the root canal system, in order to remove the lesion, the apexes of the involved roots were 3 mm resected at the desired angle (approximately 20°). Subsequently, a root-end cavity was prepared using zirconium nitrate micro-tip (Dentsply Maillefer, Ballaigues, Switzerland) driven by an ultrasonic device unit (Piezon Master 700, EMS, Nyon, Switzerland). The cavity was then dried using sterile paper points, and mineral trioxide aggregate (ProRoot MTA, DENTSPLY Tulsa Dental, Tulsa, OK, USA) was used as the root-end filling material [Figure 4]. The reflected tissues were then replaced into their original position and sutured with a nonresorbable 4-0 suture (Ethicon Inc., Piscataway, NJ, USA).

After surgery, the patient was advised to avoid mouth rinsing, hard and hot food, hot drinks, heavy physical activity, and toothbrushing on the day of surgery. The patient was instructed to rinse his mouth twice daily, with 0.2% chlorhexidine digluconate for plaque control for 7 days. Nonsteroidal anti-inflammatory drugs were prescribed after the surgical procedure. Sutures were removed 5 days after surgery. The 48-month follow-up showed the resolution of spontaneous pain, the absence of other pathological signs and symptoms, and the radiographic resolution of the lesions, confirmed at 8 years follow-up [Figure 5].

Case report 2

A 44-year-old male, classified as ASA I, reported spontaneous mild pain, also exacerbated while chewing, located in the region of the left second maxillary premolar (#2.5), that was treated by orthograde endodontic treatment years before. The patient referred symptoms soon after the orthograde treatment of #2.5. Pain was exacerbated by finger pressure in the apical buccal area.

In this case, periapical radiograph and CBCT images showed endodontic overfilling without periapical radiolucency [Figures 6 and 7]. An apical bone fenestration was visible after tridimensional radiographic reconstruction in correspondence of the apex of the #2.5. Due to the persistence of the pain, assuming a possible periapical inflammatory reaction due to the overfilling, in agreement with the patient,

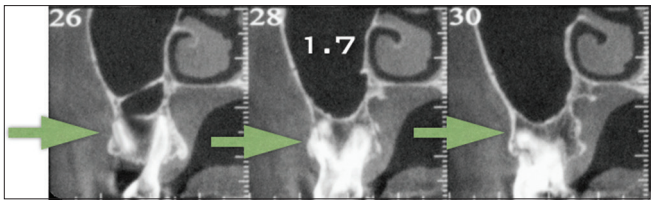

Figure 2: Cone-beam computed tomography view of the teeth showing a peculiar anatomy of the mesial root near the distal one and without the presence of the buccal cortical bone in the apical region.

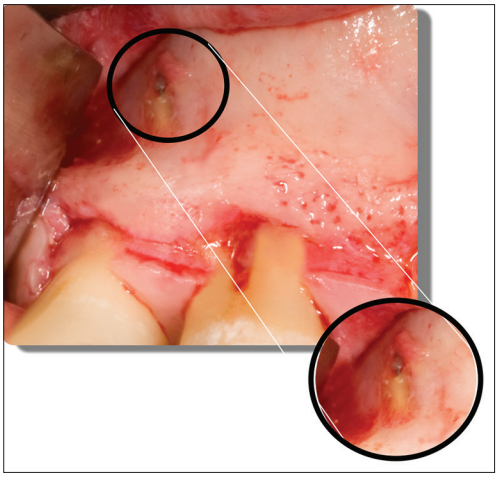

Figure 3: Clinical view before apical resection showing overfilling.

Figure 4: Clinical view after root-end management.

it was decided to perform an exploratory flap to complete the diagnosis. Preoperatively, the patient was fully informed about the surgical protocol and clinical alternatives. The preoperative and postoperative protocol was the same applied in the case report described before. A PBI approach was adopted, with a triangular flap having one horizontal incision and one vertical incision, the latter located distally to tooth #2.3. Magnifying surgical

loupes (×4.3) were used. Following flap elevation, a capsulated lesion was visible in correspondence of the apex of #2.5 [Figure 8]. After a careful removal of the lesion, it was clearly visible more than 1 mm of the plastic carrier of a carrier-based root canal obturation technique extruded [Figure 9]. Using a hot burnisher with a small round head, the extraradicular carrier was cut, and the gutta-percha was compacted [Figure 10].

The reflected tissues were then replaced into their original position and sutured with a nonresorbable 5-0 suture (Ethicon Inc., Piscataway, NJ, USA).

The 48-month follow-up showed the complete resolution of the clinical situation [Figure 11].

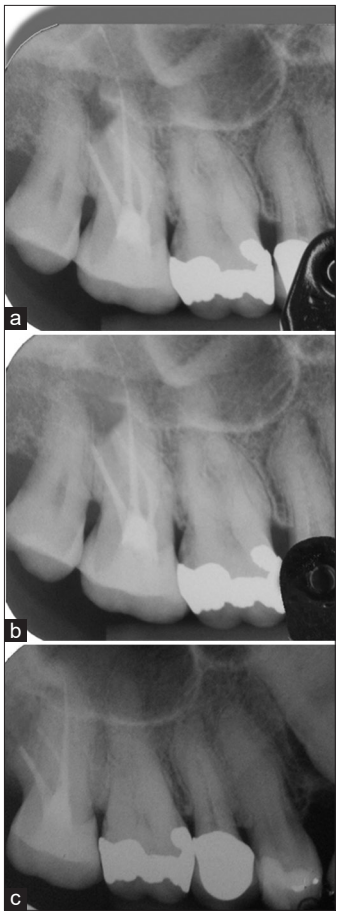

Figure 5: (a) Immediate postoperative periapical radiograph. (b) Periapical radiograph after 1 year showing periapical healing. (c) Periapical radiograph after 4 years confirms periapical healing. w. Further periapical radiograph after 8 years underlined periapical healing.

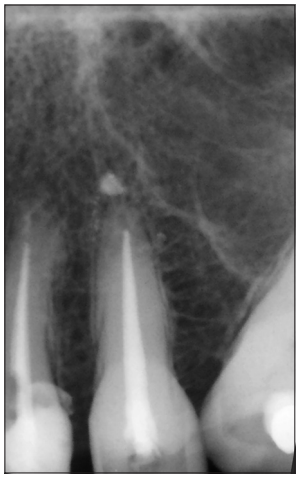

Figure 6: Preoperative periapical radiograph.

DISCUSSION

The two presented cases showed the resolution of the symptoms and of clinical and radiographic signs of the extrusion of the plastic carrier used for endodontic obturation, which caused periapical/periradicular

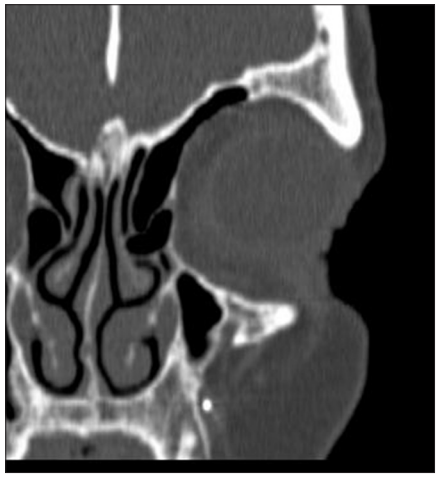

Figure 7: Cone-beam computed tomography view showing the presence of radio-opaque overfilling.

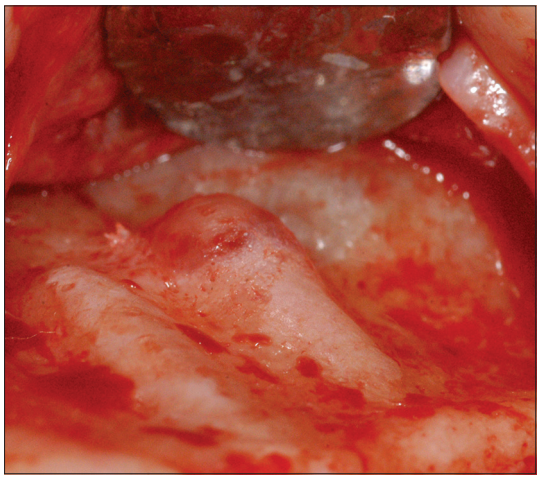

Figure 8: Clinical view showing the presence of a capsulated inflammatory reaction.

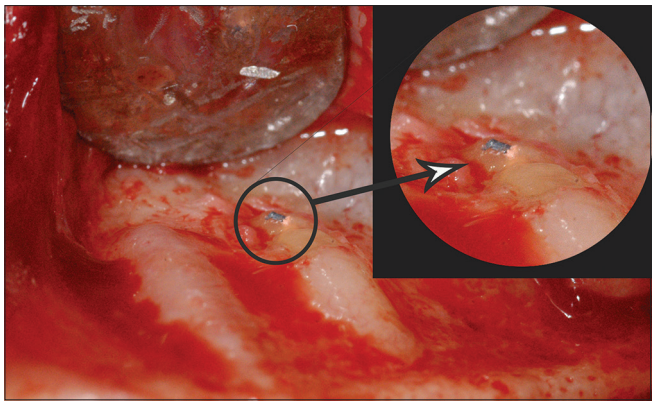

Figure 9: Clinical view after the curettage of the lesion showing the evidence of extrusion of the plastic carrier.

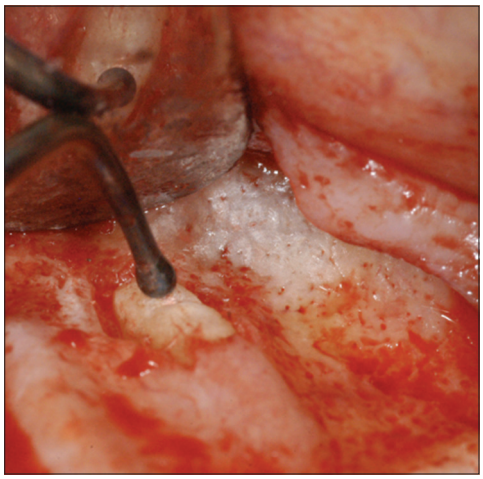

Figure 10: Apical sealing removing the excess of the carrier and burning gutta-percha.

Figure 11: (a) Periapical radiograph after 1 year showing good periapical healing. (b) Periapical radiograph after 4 years confirms periapical healing.

inflammation. In order to remove the noxious agent, we consider that the best treatment option was represented by one surgical approach.

As for methodological issues of the present study, when evaluating the outcomes of the treatment, the reader should consider that the external validity of the results is limited by the fact that we treated just two cases.

In authors' opinion, the first issue to be addressed is about the diagnostic process. Postoperative pain is a relatively frequent occurrence after root canal treatment, as it was widely demonstrated by a number of published studies.[15-17] In most cases, the resolution of the symptoms occurred in 5–7 days and could be facilitated by the assumption of anti-inflammatory drugs and painkillers.[15] In cases of persistent pain (even mild and with sporadic exacerbation), since the causes of such symptoms could be extremely variable, the diagnosis could be difficult. In these patients, the clinical evaluation should include periodontal probing, in order to detect, in particular cases, the presence of deep and narrow bone defects that could be usually related to the presence of one vertical root fracture[18] or, in general, one periodontal pocket. In the absence of periodontal pockets of more than 4 mm, palpation and a slight hand pressure can help to identify the presence of an apical inflammation.[19,20] In the cases described, palpation deep in the vestibulum has given precise indications about the position of the apex, located outside the cortical plate.

In one case, periapical radiographs allowed to identify the presence of a periapical radiolucency, but periapical radiographs allowed to easily identify the presence, in one of the described cases, of a periapical radiolucency, but at the same time, it was not able to show the extrusion of the plastic carrier from the apical foramen.[21] Tridimensional radiography (CBCT) was, on the contrary, able to detect easily the extrusion of the gutta-percha used for root canal obturation and allowed to understand the anatomical tridimensional relationship between the root apex and the cortical bone.[22,23]

Since, in both the presented cases, an orthograde approach was judged to be not feasible or not indicated in the presence of adequate tridimensional root filling (evaluated through periapical radiographs) and there was the need of a direct visualization to complete the diagnostic process, a surgical approach was chosen and performed.

The periapical surgery approach that was adopted in the described case reports included the use of

magnification devices, accurate soft tissue, and root apex management. In the cases described, the endodontic surgical approach served primarily to allow a direct visualization of the root ends for diagnosis, and this was the reason why we designed relatively large surgical flaps.

Since the extrusion of the plastic carrier from the apical foramen was described, in literature, to be a relatively frequent occurrence (with a prevalence of up to 80%, as it was reported by Tennert in 2013),[24] it could be hypothesized that it can represent one of the causes of the postoperative pain sensation.[25] As for the subjects treated in the described case reports, pain was perceived for months and, even though it presented clinically different as compared to immediate postoperative pain, we can postulate that the cause of such sensation was but the contact between the extruded plastic carrier and the periosteum. Even though we decided to avoid a histologic analysis that could have confirmed the direct contact between the plastic carrier and periosteal tissues, the direct visualization of such portion seemed to support this hypothesis.

In similar cases, when a fenestration in the apical bone is present, other authors demonstrated that a surgical approach that included the removal of the apical portion of the root could be a viable treatment option and led to the resolution of the clinical signs and symptoms.

However, to our knowledge, we could not find in scientific literature other studies about this particular situation that can be probably considered relatively common.

Despite the limitations of the present study, endodontic surgery could be successfully applied for the resolution of a nonspecific clinical situation, showing the presence of plastic carrier extrusion and apical inflammation due to the absence of cortical plate. More studies are needed in order to confirm the hypothesis the authors made to justify the treatment and to explain the resolution of the clinical cases.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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