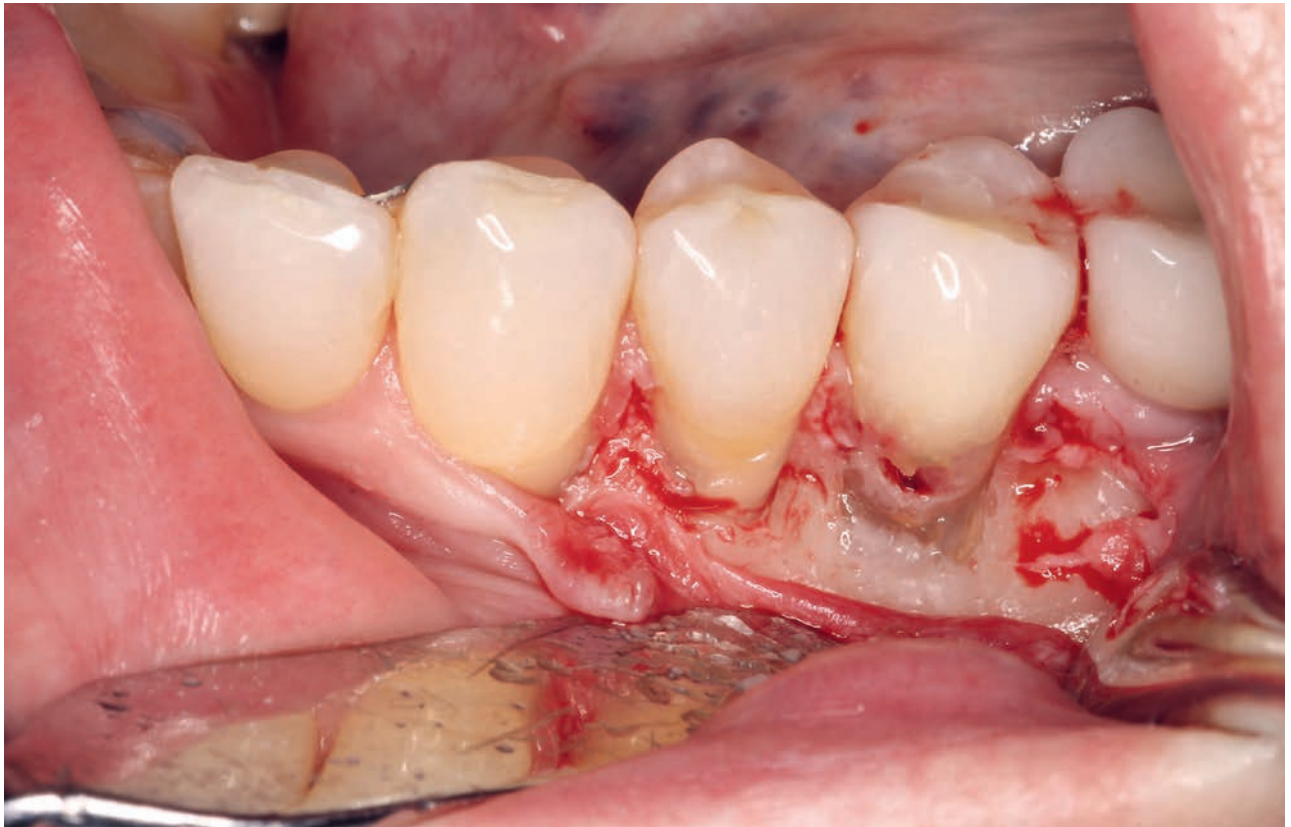




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Treatment of External Cervical Resorption via Surgical Crown Lengthening and Concomitant Placement of a Resin-Modified Glass-Ionomer Restoration: A Case Series with 1- to 4-Year Follow-up

External cervical resorption is a disease entity with an idiopathic etiology by which osteoclastic invasion cavitates teeth near the cemento-enamel junction. The lesion, if left untreated, has the potential to progress and compromise tooth maintainability. Treatment of these lesions requires access (often surgical), removal of the affected tissue, and placement of a restorative material. This case series documents 10 external cervical resorption lesions that were treated by surgical crown lengthening with concurrent placement of a resin-modified glass-ionomer restoration and followed up for a period ranging from July 2020 to July 2024. This case series offers evidence that external cervical resorption can be treated with a high expectancy of tooth survival. Longer-term follow-ups are needed to see if this treatment remains stable and predictable. *Int J Periodontics Restorative Dent* 2026;46:519–526. doi: 10.11607/prd.7452

Keywords: crown lengthening, tooth resorption

Root resorption is a phenomenon that describes a number of pathologies stemming from a multitude of etiologies. Resorptive lesions can be classified as either internal or external and further subcategorized based on their clinical presentation.¹ One class of these is external cervical resorption (ECR), which is characterized by resorptive defects due to osteoclastic

invasion.² ECR cases have a variety of initiators, including but not limited to external trauma, surgical insult, intracoronal bleaching, and aggressive orthodontic movement.^{3,4} Diagnosis of ECR lesions can be difficult or go undetected, as patients are often asymptomatic. Intraoral radiographs and clinical examination usually reveal the cavitated lesion along the cervical aspect of the tooth. Early

detection of the lesion is paramount to prevent disease progression, which progresses in three phases, comprising the initiation, resorption, and repair stages.⁵ The rate of progression, given the dynamic process and unclear etiology, is difficult if not impossible to predict.

The classic diagnostic grading has been based on the depth of the resorptive invasion.⁶ In this grading system, class 1 is a shallow cervical lesion, class 2 penetrates further into dentin, while classes 3 and 4 likely invade the pulp chamber and extend more significantly in a coronapical direction.³ A more recent classification by Patel et al has been proposed that uses a three-dimensional approach, subcategorizing the lesions based on height, circumferential spread, and proximity of the resorption to the pulp chamber.⁷ In that classification, the first category is height of the lesion, increasing in severity as follows: at the cemento-enamel junction (supracrestal), extending into the coronal third of root (subcrestal), extending into middle third of root, or extending to apical third of root. The second category describes circumferential spread of the lesion, increasing in severity as follows: < 90 degrees, 90 to 180 degrees, 180 to 270 degrees, and > 270 degrees. The third category describes proximity to the pulp chamber, either invading the canal or apart from the canal.

Treatment options of ECR teeth include extraction, monitoring, or removal of affected tissue either internally, externally, or with a combination approach.⁸ Given the scope of this case series, the focus is limited to internal and external treatment of affected tissue. The efficacy of treatment is negatively associated with the severity of the resorption, but generally necessitates removal of the resorptive tissue and reconstruction of the affected tissue. Heithersay⁶ treated 101 teeth with varying degrees of ECR with a topical application of 90% aqueous solution of trichloroacetic acid, curettage, root canal therapy if needed, and placement of a glass-ionomer restoration, and only one tooth was extracted due to continued resorption. However, a separate study demonstrated less-promising results when the resorption was more severe. Treatment of class 1 and 2 lesions (per Heithersay's classification) had a 100% success rate, while class 3 lesions had a 78% success

rate, and class 4 lesions had a 12.5% success rate.³ Therefore, ECR is an obscure disease entity with an unclear etiology for which treatment results in varying rates of success.

There have been a multitude of treatment modalities posited for external cervical resorption, including intentional replantation, guided tissue regeneration, and forced eruption to access the lesion operatively following endodontic therapy.⁷ Another means to access the lesion is by surgical crown lengthening, which allows exposure of the entire resorptive lesion to facilitate its restoration.⁹ This interdisciplinary approach often requires endodontic treatment prior to the surgery, followed by surgical access and osteotomy to debride and restore the tooth and ensure adequate supracrestal tissue attachment dimension.^{10,11} The portal of entry is restored with resin-modified glass ionomer due to the possibility of epithelial and connective tissue attachment to the material.¹² Not only does resin-modified glass ionomer support periodontal tissue attachment, but the biofilm has more favorable microflora compared to micro-filled composite, which is more likely to present with red and orange complex periodontal pathogens.^{13,14} The following retrospective case series demonstrates successful short-term outcomes using the aforementioned protocols to treat ECR.

Materials and Methods

Clinical Presentation and Surgical Case Management

This case series adhered to the appropriate CARE or standardized case-reporting guidelines.¹⁵ Ten patients who were ASA Class I and II were referred to a private periodontal practice for evaluation and treatment of asymptomatic external cervical resorptive lesions (n = 10 lesions). The severity of the lesions varied, ranging from Heithersay classes 1 to 3 (Table 1). In all teeth except one, the extent of the lesions necessitated that endodontic therapy be performed prior to periodontal and restorative treatment. Figures 1 to 9 and Figs 10 to 15 show case two representative ECR cases who received treatment.

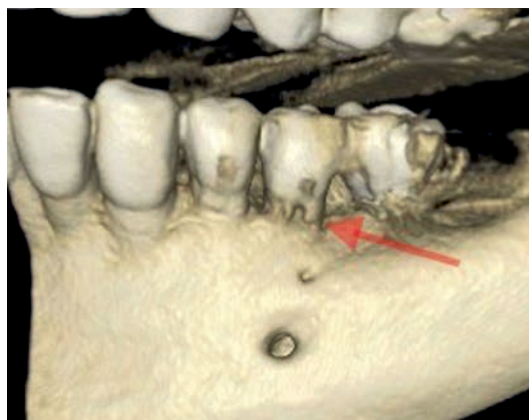
Table 1 Preoperative and Postoperative Summary of Cases

Case no.	Tooth no. ^a	Site	Lesion depth	Heithersay classification	PD range		Follow-up
					Preop	Postop	
1	43	Facial	RCT required	Class 3	3–4 mm	3–4 mm	48 mo
2	11	Facial + mesial	RCT required	Class 3	4–6 mm	3–5 mm	20 mo
3	14	Facial	RCT required	Class 1	3–5 mm	3–4 mm	21 mo
4	41	Lingual	RCT required	Class 1	2–3 mm	2–3 mm	34 mo
5	11	Palatal	RCT required	Class 2	2–3 mm	2–3 mm	13 mo
6	34	Facial	RCT required	Class 3	3–4 mm	3–4 mm	17 mo
7	21	Palatal	RCT required	Class 2	2–3 mm	2–3 mm	25 mo
8	35	Facial	RCT required	Class 2	3–4 mm	3–4 mm	13 mo
9	37	Distal	RCT not required	Class 1	5–6 mm	3–4 mm	12 mo
10	36	Facial	RCT required	Class 2	3–5 mm	3–4 mm	12 mo

^aFDI numbering system.



▲ **Fig 1** Preoperative periapical radiograph of one lesion representative of ECR (case 8, as per Table 1), located on the buccal aspect of the mandibular left second premolar.



▲ **Fig 2** Preoperative CBCT reconstruction of the ECR lesion.



▲ **Fig 3** Preoperative clinical view of the cavitated lesion, located subgingivally and presenting with the prototypical pink hue.



▲ **Fig 4** Surgical exposure of ECR lesion shows its proximity to the osseous crest.



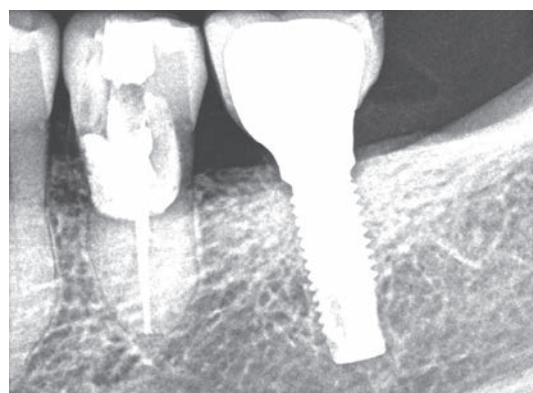
▲ **Fig 5** Osteotomy and osteoplasty were performed to allow access to the lesion and adequate supracrestal tissue attachment space.



▲ **Fig 6** Following excavation of the lesion, the site was restored with resin-modified glass ionomer.



▲ **Fig 7** The flap was sutured, and none of the gingiva was excised, thus facilitating the patient's plaque control efforts.



▲ **Fig 8** An immediate postoperative radiograph illustrates the restoration of the resorptive lesion.



▲ **Fig 9** The clinical view at 13 months postoperative shows site stability both periodontally and restoratively.



▲ **Fig 10** Periapical radiograph of another representative ECR patient (case 1, as per Table 1), with resorption suggested on the mandibular right canine.

All patients underwent preoperative CBCT evaluation to delineate the extent of their lesions (see Figs 1, 2, 10, and 11). Regarding lesion height, the lesions were a combination of class 2 and 3 (per

Heithersay's classification), meaning the lesion extended from the coronal third (subcrestal) to the middle third of the root. Per Patel et al's subclassification, 8 out of the 9 lesions were spread



▲ **Fig 11** 3D CBCT representation of the external resorptive lesion.



▲ **Fig 12** Following flap elevation and ostectomy, the lesion was adequately visualized and accessed for debridement and restoration.



▲ **Fig 13** The clinical view at the 2-year follow-up shows periodontal and restorative stability.



▲ **Fig 14** The periapical radiograph at the 2-year follow-up shows marginal integrity of the restoration.

< 90 degrees circumferentially, but one lesion extended beyond a line angle to 180 degrees. There was no apparent pattern of presentation regarding location, as lesions were diagnosed and treated in all sextants of the mouth.

All lesions presented clinically as cavitated entry portals, usually void of signs or symptoms (see Fig 3). However, most cavitated sites appeared to have a pinkish hue, which has been prototypical for ECR.⁹ Treatment included the steps described in the next paragraph.

Patients received local anesthesia using local infiltration. A full-split flap was elevated to expose the resorptive lesion (see Figs 4 and 12). Ostectomy and osteoplasty were performed to both isolate the



▲ **Fig 15** The clinical view at the 4-year follow-up shows successful retention of the tooth.

lesion prior to its excavation and to create positive osseous architecture¹⁶ (see Fig 5). Excavation of

the lesion was accomplished with a combination of slow-speed rotary and hand instrumentation until the unaffected tooth structure was reached. The lesion's morphology was refined to allow for defined margins for the preparation. Restoration of the site was accomplished using a resin-modified glass ionomer (Geristore; see Fig 6) following the manufacturer's instructions. The flap was then apically repositioned to maintain gingival tissue width (see Fig 7). A postoperative radiograph was exposed to provide a baseline for future comparison of the site over time (see Fig 8). Given that the patients had been and would continue to be subjected to numerous follow-up radiographs, a standard periapical image was exposed for baseline vs CBCT to confirm future radiographic stability, which would also minimize patient exposure. The patients received standard postoperative instructions and were seen for ongoing postoperative visits to evaluate healing and review oral hygiene efforts. Patients were further followed up with recall schedules on a 4- to 6-month interval, where both follow-up photographs (see Figs 9, 13, and 15) and radiographs (see Fig 14) were taken periodically to assess the stability of treatment.

Results

The mean follow-up for the 10 cases was 21 months (range: 12 to 48 months). The tooth survival rate was 100%, and only 1 of the 10 cases required revision at 3 months due to ongoing localized edema and erythema. The cause of this was determined to have been a void in the restoration, which was addressed by adding additional restorative material. Unique to this case was that the lesion involved multiple surfaces and spread circumferentially, presenting as a more advanced lesion according to Patel et al's classification. All other cases were restored uneventfully and remained stable based on both clinical and radiographic follow-ups. Patient satisfaction was high, based on direct feedback. Of the 10 lesions, 9 were located at sites where esthetics did not factor into the outcome. However, the one case in the esthetic zone had a circumferential lesion that was revised, resulting in suboptimal esthetics

due to increased length of the clinical crown and attendant "black triangles." In anticipation of this, the patient was made aware of this likely outcome prior to treatment. Despite this, the patient was still extremely satisfied with the result, given her low lip line masked the esthetic compromise and because her chief concern of tooth retention was accomplished.

Discussion

This case series confirms that external cervical resorptive cases can be predictably managed without the need for tooth extraction, provided the lesion is diagnosed in the earlier stages. The combination of surgical exposure of the resorptive lesion along with osseous removal facilitates visualization and ease of management. Critical to success is proper isolation and maintaining a dry field during placement of the restoration, which can at times be challenging with this technique. This may help to explain why one case required a revision due to a void left in the material. Isolation of these sites was accomplished with the use of local anesthetics containing vasoconstrictors and cotton rolls. Following restoration placement, the flap was apically positioned with periosteal tacking sutures. This technique is preferred, when possible, to avoid submarginal incisions on buccal sites to maintain gingival width. The lesions located on the palatal and lingual aspects were treated with a submarginal flap design as a means to apically position the gingival complex. Ongoing stability and success rates for this patient cohort were defined by maintenance of mucogingival dimensions, minimal probing depths with an absence of bleeding, and no radiographic or clinical sign of lesion recurrence. Apart from success rate, the total survival rate of teeth was the same, given that none of the treated teeth required extraction due to fracture, infection, or disease recurrence.

Though the therapy appears efficacious, there are several aspects that necessitate further research and assessment. Excavation and tooth preparation have typically been performed mechanically. Further research is needed to determine whether chemotherapeutic eradication of

the lesion would provide any additional benefit. Furthermore, additional comparisons of a variety of restorative materials to treat this specific entity seems warranted. The material of choice would ideally be friendly to the gingival attachment apparatus as well as be workable in an intraoperative environment where isolation is a challenge.

This case series documents successful outcomes of up to 4 years, though most presented cases were followed for 1 to 2 years at the time of reporting. To the present authors' knowledge, this coincides with the typical follow-up presented in the periodontal literature.¹⁷ However, a major drawback to this case series is the small sample size and short follow-up. Mavridou et al reports treatment outcomes for up to 10 years, with a mean of 5 years, and a survival rate of 70.3% following their treatment algorithm and decision tree.⁸ As the length of follow-up increases for treatment with external and internal approaches, the overall number of failures increase. Therefore, ongoing and longer-term follow-up is necessary to determine prognosis, treatment success, and tooth survival rates. Only when long-term results are documented in a number of publications can the profession better compare success and survival rates of restored ECR teeth to that of dental implants. Most studies find 10-year survival rates of dental implants to be approximately 93%.¹⁸ However, the rate of peri-implantitis can range from 28% to 56%, which affects patients' clinical, financial, and psychologic well-being and is not necessarily reflected by implant survival rate.^{19,20} Therefore, implants are far from infallible, and, given growing concerns with peri-implantitis, tooth retention should be considered in the discussion of treatment alternatives.²⁰ Comparison of long-term outcomes of treated ECR teeth vs implants, though yet to be reported, will provide a critical piece of information to aid patients in deciding which avenue to choose: extraction or retention of teeth.

Conclusions

ECR lesions are challenging pathologies that requires both early diagnosis and careful

management to achieve successful outcomes. This case series documents the successful treatment up to 4 years of patients who presented with early ECR. The treatment method used involved endodontic therapy followed by surgical exposure with ostectomy for access and restoration with a glass ionomer, leading to a 100% retention rate over an average of 21 months. Future observations with longer-term follow-ups and a larger cohort of patients with multiple clinicians is needed to determine the efficacy of this approach.

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Author contributions: A.S.G.: one of the primary clinicians, primary author; D.A.G.: one of the primary clinicians; P.S.R.: aided in method technique, significant contributions in compiling manuscript.

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