

Traumatic Injuries: An Online Study Guide

Abstract

The Editorial Board of the *Journal of Endodontics* has developed a literature-based study guide of topical areas related to endodontics. This study guide is intended to give the reader a focused review of the essential endodontic literature and does not cite all possible articles related to each topic. Although citing all articles would be comprehensive, it would defeat the idea of a study guide. This section will present classification of traumatic injuries, crown/root and root fractures, canal obliteration secondary to traumatic injuries, root resorption secondary to traumatic injuries (internal resorption, invasive cervical resorption, and external resorption), horizontal root fractures, treatment of the avulsed tooth, splinting, pulp vitality secondary to traumatic injuries, alternative methods for testing for pulp vitality, and treatment of the intruded tooth. (*J Endod* 2008;34:e93–e102)

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Introduction

The delivery of high quality clinical care requires a thorough understanding of the endodontic literature. The Editorial Board of the *Journal of Endodontics* has developed this online study guide for endodontists and fellow clinicians interested in endodontics.

There are several potential applications for an online study guide. First, an online study guide permits clinicians to focus in on particular areas of endodontics where they can quickly review key papers devoted to one particular topic. For example, this particular study guide provides a summary of key papers in the area of classification of traumatic injuries, crown/root and root fractures, canal obliteration secondary to traumatic injuries, root resorption secondary to traumatic injuries (internal resorption, invasive cervical resorption, and external resorption), horizontal root fractures, treatment of the avulsed tooth, splinting, pulp vitality secondary to traumatic injuries, alternative methods for testing for pulp vitality, and treatment of the intruded tooth.

Second, a study guide permits speakers to efficiently review background material in preparation for future courses, lectures, or continuing educational events. Third, an online study guide permits students to review key papers in preparation for future examinations or for development of residency seminars. Fourth, an online study guide permits readers to quickly and efficiently access either the abstract or the entire paper cited in the Tables (see Discussion for details).

Methods

One potential problem in developing an online study guide was to provide a summary of major papers that contributed to a given topic area. The inclusion of all possible papers on a given topic would lead to an unwieldy collection that failed to clearly identify key papers in the area. Of course, exclusion of key papers is also problematic. To address this issue, the *JOE* Editorial Board developed the overall list of topics to be covered and then for each topic generated an initial tabulation of key historical and contemporary papers on that topic. This list was then sent to two outside reviewers who were both experienced educators and Diplomates of the American Board of Endodontics. These reviewers then recommended additions and deletions of papers to the proposed topic list.

To maintain currency, the *JOE* Editorial Board proposes to periodically update each topical study guide by using the same peer-reviewed process as described above.

Results

The results of the study guide (1–135) provide an overview of selected literature on classification of traumatic injuries, crown/root and root fractures, canal obliteration secondary to traumatic injuries, root resorption secondary to traumatic injuries (internal resorption, invasive cervical resorption, and external resorption), horizontal root fractures, treatment of the avulsed tooth, splinting, pulp vitality secondary to traumatic injuries, alternative methods for testing for pulp vitality, and treatment of the intruded tooth. This information is organized into Tables 1-12.

Discussion

The journey to clinical excellence requires not only outstanding clinical skills, but also that special knowledge that accrues from a study of the endodontic literature. The purpose of the *JOE* online study guide is to serve as one source for efficiently reviewing key papers that are organized by topic area and presented with the advantages of online Internet technology.

Although *JOE* readers are undoubtedly familiar with many aspects of the Internet, there are special features available at *JOE* online that provide particular advantages in their application for a study guide. For example, if this particular

Online Study Guide

study guide is downloaded as a pdf, it provides a useful but static listing of the cited articles. On the other hand, if the reader navigates to the Table of Contents page for the Online Study Guide and then clicks on “Full Text” (Fig. 1), they will be taken to an HTML version of the Study Guide. This online version of the study guide has special capabilities including the fact that the references are hyperlinked. Thus, the reader can quickly obtain abstracts of nearly all cited papers and can review the entire paper of many of the cited papers

with only a few clicks of their mouse (Fig. 2). Thus, combining a study guide with online capabilities provides particular benefits for efficiently reviewing key papers in the endodontic literature.

We hope that this Study Guide will prove useful to you as one source for developing a focused and special base of endodontic knowledge. As always, we are interested in your thoughts on this initiative and how the *JOE* can better serve you, our readers. Feel free to email us at: JEndodontics@UTHSCSA.edu.

TABLE 1. Classification of Traumatic Injuries

Ref #	Title
1.	Glendor E, Marcenes W, Andreasen JO. Classification, epidemiology and etiology: chapter 8. In: Andreasen JO, Andreasen FM, Andersson L, eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:217–54.
2.	Trope M, Blanco L, Chivian N, Sigurdsson A. The role of endodontics after dental traumatic injuries: chapter 16. In: Cohen S, Hargreaves KM. Pathways of the pulp. 9th ed. St Louis, MO: Mosby/Elsevier, 2006:610–49.
3.	Andreasen JO. Challenges in clinical dental traumatology. <i>Endod Dent Traumatol</i> 1985;1:45–55.
4.	Croll TP, Brooks EB, Schut L, Laurent JP. Rapid neurologic assessment and initial management for the patient with traumatic dental injuries. <i>J Am Dent Assoc</i> 1980;100:530–4.
5.	Bakland LK, Andreasen JO. Dental traumatology: essential diagnosis and treatment planning. <i>Endo Topics</i> 2004;7:14–34.

TABLE 2. Classification of Crown, Crown/Root Fractures, and Root Fractures

Ref #	Title
6.	Andreasen FM, Andreasen JO. Crown fractures: chapter 10. Andreasen JO, Andreasen FM, Tsukiboshi M. Crown-root fractures: chapter 11. In: Andreasen JO, Andreasen FM, Andersson L, eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:280–336.
7.	Rauschenberger CR, Hovland EJ. Clinical management of crown fractures. <i>Dent Clin North Am</i> 1995;39:25–51.

TABLE 3. Canal Obliteration Secondary to Traumatic Injuries

Ref #	Title
8.	Patterson SS, Mitchell DF. Calcific metamorphosis of the dental pulp. <i>Oral Surg Oral Med Oral Pathol</i> 1965;20:94–101.
9.	Holcomb JB, Gregory WB. Calcific metamorphosis of the pulp: its incidence and treatment. <i>Oral Surg Oral Med Oral Pathol</i> 1967;24:825–30.
10.	Jacobsen I, Kerekes K. Long-term prognosis of traumatized permanent anterior teeth showing calcifying processes in the pulp cavity. <i>Scand J Dent Res</i> 1977;85:588–98.
11.	Andreasen JO. Luxation of permanent teeth due to trauma: a clinical and radiographic follow-up study of 189 injured teeth. <i>Scand J Dent Res</i> 1970;78:273–86.
12.	Lundberg M, Cvek M. A light microscopy study of pulps from traumatized permanent incisors with reduced pulpal lumen. <i>Acta Odontol Scand</i> 1980;38:89–94.
13.	Cvek M, Granath L, Lundberg M. Failures and healing in endodontically treated non-vital anterior teeth with post-traumatically reduced pulpal lumen. <i>Acta Odontol Scand</i> 1982;40:223–8.
14.	Andreasen FM. Transient apical breakdown and its relation to color and sensibility changes after luxation injuries to teeth. <i>Endod Dent Traumatol</i> 1986;2:9–19.
15.	Andreasen FM, Yu Z, Thomsen BL, Andersen PK. Occurrence of pulp canal obliteration after luxation injuries in the permanent dentition. <i>Endod Dent Traumatol</i> 1987;3:103–15.
16.	Schindler WG, Gullickson DC. Rationale for the management of calcific metamorphosis secondary to traumatic injuries. <i>J Endod</i> 1988;14:408–12.
17.	Akerblom A, Hasselgren G. The prognosis for endodontic treatment of obliterated root canals. <i>J Endod</i> 1988;14:565–7.
18.	Robertson A, Andreasen FM, Bergenholtz G, Andreasen JO, Noren JG. Incidence of pulp necrosis subsequent to pulp canal obliteration from trauma to permanent incisors. <i>J Endod</i> 1996;22:557–60.
19.	Amir FA, Gutmann JL, Witherspoon DE. Calcific metamorphosis: a challenge in endodontic diagnosis and treatment. <i>Quint Internat J</i> 2001;32:447–55.

TABLE 4. Root Resorption Secondary to Traumatic Injuries: Internal Resorption

Ref #	Title
20.	Toto PD, Restarski, JS. The histogenesis of pulpal odontoclasts. <i>Oral Surg Oral Med Oral Pathol</i> 1963;16:172–8.
21.	Gartner AH, Mack T, Somerlott RG, Walsh LC. Differential diagnosis of internal and external root resorption. <i>J Endod</i> 1976;2:329–34.
22.	Frank AL, Weine FS. Nonsurgical therapy for the perforative defect of internal resorption. <i>J Am Dent Assoc</i> 1973;87:863–8.
23.	Wedenberg C, Zetterqvist L. Internal resorption in human teeth: a histological, scanning electron microscopic, and enzyme histochemical study. <i>J Endod</i> 1987;13:255–9.

TABLE 5. Root Resorption Secondary to Traumatic Injuries: Invasive Cervical Resorption

Ref #	Title
24.	Yaacob HB. The resistant dentine shell of teeth suffering from idiopathic external resorption. <i>Aust Dent J</i> 1980;25:73–5.
25.	Frank AL. External-internal progressive resorption and its non-surgical correction. <i>J Endod</i> 1981;7:473–6.
26.	Frank AL, Bakland LK. Nonendodontic therapy for supraosseous extracanal invasive resorption. <i>J Endod</i> 1987;13:348–55.
27.	Frank AL, Torabinejad M. Diagnosis and treatment of extracanal invasive resorption. <i>J Endod</i> 1998;24:500–4.
28.	Heithersay GS. Clinical, radiologic, and histopathologic features of invasive cervical resorption. <i>Quintessence Int</i> 1999;30:27–37.
29.	Heithersay GS. Invasive cervical resorption: an analysis of potential predisposing factors. <i>Quintessence Int</i> 1999;30:83–95.
30.	Heithersay GS. Treatment of invasive cervical resorption: an analysis of results using topical application of trichloroacetic acid, curettage, and restoration. <i>Quintessence Int</i> 1999;30:96–110.
31.	Heithersay GS. Invasive cervical resorption. <i>Endod Topics</i> 2004;7:73–92.

TABLE 6. Root Resorption Secondary to Traumatic Injuries: Surface, Inflammatory, and Replacement Resorption

Ref #	Title
32.	Andreasen JO, Andreasen FM. Root resorption following traumatic dental injuries. <i>Proc Finn Dent Soc</i> 1992;88:95–114.
33.	Trope M. Root resorption due to dental trauma. <i>Endod Topics</i> 2002;1:79–100.
34.	Fuss Z, Tsesis I, Lin S. Root resorption: diagnosis, classification and treatment choices based on stimulation factors. <i>Dental Traumatol</i> 2003;19:175–82.

TABLE 7. Horizontal Root Fracture

Ref #	Title
35.	Andreasen FM, Andreasen JO, Cvek M. Root fractures: chapter 12. In: Andreasen JO, Andreasen FM, Andersson L, eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:337–71.
36.	Andreasen JO, Hjorting-Hansen E. Intraalveolar root fractures: radiographic and histologic study of 50 cases. <i>J Oral Surg</i> 1967;25:414–26.
37.	Michanowicz AE, Michanowicz JP, Abou-Rass M. Cementogenic repair of root fractures. <i>J Am Dent Assoc</i> 1971;82:569–79.
38.	Cvek M. Treatment of non-vital permanent incisors with calcium hydroxide: IV—periodontal healing and closure of the root canal in the coronal fragment of teeth with intra-alveolar fracture and vital apical fragment: a follow-up. <i>Odont Revy</i> 1974;25:239–46.
39.	Zachrisson BU, Jacobsen I. Long-term prognosis of 66 permanent anterior teeth with root fracture. <i>Scand J Dent Res</i> 1975;83:345–54.
40.	Jacobsen I, Zachrisson BU. Repair characteristics of root fractures in permanent anterior teeth. <i>Scand J Dent Res</i> 1975;83:355–64.
41.	Jacobsen I, Kerekes K. Diagnosis and treatment of pulp necrosis in permanent anterior teeth with root fracture. <i>Scand J Dent Res</i> 1980;88:370–6.
42.	Andreasen FM, Andreasen JO. Resorption and mineralization processes following root fracture of permanent incisors. <i>Endod Dent Traumatol</i> 1988;4:202–14.
43.	Andreasen FM, Andreasen JO, Bayer T. Prognosis of root-fractured permanent incisors: prediction of healing modalities. <i>Endod Dent Traumatol</i> 1989;5:11–22.
44.	Robertson CUJ, Cunningham SA. A one-stage calcific barrier technique in a root-fractured incisor tooth: a case report. <i>Int Endod J</i> 1991;24:67–71.
45.	Yates JA. Root fractures in permanent teeth: a clinical review. <i>Int Endod J</i> 1992;25:150–7.
46.	Feiglin B. Clinical management of transverse root fractures. <i>Dent Clin North Am</i> 1995;39:53–79.
47.	Caliskan MK, Pehlivan Y. Prognosis of root-fractured permanent incisors. <i>Endod Dent Traumatol</i> 1996;12:129–36.
48.	Cvek M, Andreasen JO, Borum MK. Healing of 208 intraalveolar root fractures in patients aged 7-17 years. <i>Dent Traumatol</i> 2001;17:53–62.
49.	Cvek M, Mejare I, Andreasen JO. Healing and prognosis of teeth with intra-alveolar fractures involving the cervical part of the root. <i>Dent Traumatol</i> 2002;18:57–65.
50.	Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures: 1—effect of pre-injury and injury factors such as sex, age, stage of root development, fracture type, location of fracture and severity of dislocation. <i>Dent Traumatol</i> 2004;20:192–202.
51.	Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures: 2—effect of treatment factors such as treatment delay, repositioning, splinting type and period and antibiotics. <i>Dent Traumatol</i> 2004;20:203–11.
52.	Cvek M, Mejare I, Andreasen JO. Conservative endodontic treatment of teeth fractured in the middle or apical part of the root. <i>Dent Traumatol</i> 2004;20:261–9.

TABLE 8. Treatment of the Avulsed Tooth

Ref #	Title
53.	Andreasen JO, Andreasen, FM. Avulsions: chapter 17. In: Andreasen JO, Andreasen FM, Andersson L, eds. Textbook and color atlas of traumatic injuries to the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:444–88.
54.	Andreasen JO, Hjorting-Hansen E. Replantation of teeth: I—radiographic and clinical study of 110 human teeth replanted after accidental loss. <i>Acta Odontol Scand</i> 1966;24:263–86.
55.	Andreasen JO, Hjorting-Hansen E. Replantation of teeth: II—histological study of 22 replanted anterior teeth in humans. <i>Acta Odontol Scand</i> 1966;24:287–306.
56.	Cvek M, Granath LE, Hollender L. Treatment of non-vital permanent incisors with calcium hydroxide: III—variation of occurrence of ankylosis of reimplanted teeth with duration of extra-alveolar period and storage environment. <i>Odont Revy</i> 1974;25:43–56.
57.	Andreasen JO. Periodontal healing after replantation of traumatically avulsed human teeth. Assessment by mobility testing and radiography. <i>Acta Odontol Scand</i> 1975;33:325–35.
58.	Andreasen JO, Reinholdt J, Riis I, Dybdahl R, Soder PO, Otteskog P. Periodontal and pulpal healing of monkey incisors preserved in tissue culture before replantation. <i>Int J Oral Surg</i> 1978;7:104–12.
59.	Rothstein RJ, Baker FJ. Tetanus: prevention and treatment. <i>JAMA</i> 1978;240:675–6.
60.	Andreasen JO. Analysis of topography of surface and inflammatory root resorption after replantation of mature permanent incisors in monkeys. <i>Swed Dent J</i> 1980;4:135–44.
61.	Oswald RJ, Harrington GW, Van Hassel HJ. Replantation: 1—the role of the socket. <i>J Endod</i> 1980;6:479–84.
62.	Van Hassel HJ, Oswald RJ, Harrington GW. Replantation: 2—the role of the periodontal ligament. <i>J Endod</i> 1980;6:506–8.
63.	Oswald RJ, Harrington GW, Van Hassel HJ. A postreplantation evaluation of air-dried and saliva-stored avulsed teeth. <i>J Endod</i> 1980;6:546–51.
64.	Andreasen JO, Kristerson L. The effect of limited drying or removal of the periodontal ligament: periodontal healing after replantation of mature permanent incisors in monkeys. <i>Acta Odontol Scand</i> 1981;39:1–13.
65.	Tronstad L, Andreasen JO, Hasselgren G, Kristerson L, Riis I. pH changes in dental tissues after root canal filling with calcium hydroxide. <i>J Endod</i> 1981;7:17–21.
66.	Andreasen JO. The effect of pulp extirpation or root canal treatment on periodontal healing after replantation of permanent incisors in monkeys. <i>J Endod</i> 1981;7:245–52.
67.	Andreasen JO. Relationship between surface and inflammatory resorption and changes in the pulp after replantation of permanent incisors in monkeys. <i>J Endod</i> 1981;7:294–301.
68.	Skoglund A, Tronstad L. Pulpal changes in replanted and autotransplanted immature teeth in dogs. <i>J Endod</i> 1981;7:309–16.
69.	Andreasen JO, Kristerson L. The effect of extra-alveolar root filling with calcium hydroxide on periodontal healing after replantation of permanent incisors in monkeys. <i>J Endod</i> 1981;7:349–54.
70.	Andreasen JO. Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. <i>Int J Oral Surg</i> 1981;10:43–53.
71.	Matsson L, Andreasen J, Cvek M, Granath L. Ankylosis of experimentally reimplanted teeth related to extra-alveolar period and storage environment. <i>Pediatric Dent</i> 1982;4:327–9.
72.	Blomlof L, Lindskog S, Andersson L, Hedstrom KG, Hammarstrom L. Storage of experimentally avulsed teeth in milk prior to replantation. <i>J Dent Res</i> 1983;62:912–6.
73.	Blomlof L, Andersson L, Lindskog S, Kedstrom K, Hammarstrom L. Periodontal healing of replanted monkey teeth prevented from drying. <i>Acta Odontol Scand</i> 1983;41:117–23.
74.	Andersson L, Blomlof L, Lindskog S, Feiglin B, Hammarstrom L. Tooth ankylosis: clinical, radiographic and histological assessments. <i>Int J Oral Surg</i> 1984;13:423–31.
75.	Klinge B, Nilveus R, Selvig KA. The effect of citric acid on repair after delayed tooth replantation in dogs. <i>Acta Odontol Scand</i> 1984;42:351–9.
76.	Lindskog S, Pierce AM, Blomlof L, Hammarstrom L. The role of the necrotic periodontal membrane in cementum resorption and ankylosis. <i>Endod Dent Traumatol</i> 1985;1:96–101.
77.	Hammarstrom L, Blomlof L, Feiglin B, Andersson L, Lindskog S. Replantation of teeth and antibiotic treatment. <i>Endod Dent Traumatol</i> 1986;2:51–7.
78.	Kling M, Cvek M, Mejare I. Rate and predictability of pulp revascularization in therapeutically reimplanted permanent incisors. <i>Endod Dent Traumatol</i> 1986;2:83–9.
79.	Bjorvatn K, Selvig KA, Klinge B. Effect of tetracycline and SnF ₂ on root resorption in replanted incisors in dogs. <i>Scan J Dent Res</i> 1989;97:477–82.
80.	Selvig KA, Bjorvatn K, Claffey N. Effect of stannous fluoride and tetracycline on repair after delayed replantation of root-planed teeth in dogs. <i>Acta Odontol Scand</i> 1990;48:107–12.
81.	Andersson L, Bodin I. Avulsed human teeth replaced within 15 minutes: a long-term clinical follow-up study. <i>Endod Dent Traumatol</i> 1990;6:37–42.
82.	Cvek M, Cleaton-Jones P, Austin J, Lownie J, Kling M, Fatti P. Pulp revascularization in reimplanted immature monkey incisors: predictability and the effect of antibiotic systemic prophylaxis. <i>Endod Dent Traumatol</i> 1990;6:157–69.
83.	Cvek M, Cleaton-Jones P, Austin J, Kling M, Lownie J, Fatti P. Effect of topical application of doxycycline on pulp revascularization and periodontal healing in reimplanted monkey incisors. <i>Endod Dent Traumatol</i> 1990;6:170–6.
84.	Hiltz J, Trope M. Vitality of human lip fibroblasts in milk, Hanks balanced salt solution and Viaspan Storage media. <i>Endod Dent Traumatol</i> 1991;7:69–72.
85.	Trope M, Friedman S. Periodontal healing of replanted dog teeth stored in Viaspan, Milk, and Hank's balanced salt solution. <i>Endod Dent Traumatol</i> 1992;8:183–8.
86.	Trop M, Yesilsoy C, Koren L, Moshonov J, Friedman S. Effect of different endodontic treatment protocols on periodontal repair and root resorption of replanted dog teeth. <i>J Endod</i> 1992;18:492–6.
87.	Krasner P, Person P. Preserving avulsed teeth for replantation. <i>J Am Dent Assoc</i> 1992;123:80–8.
88.	Trope M, Moshonov J, Nissan R, Buxt P, Yesilsoy C. Short vs long-term calcium hydroxide treatment of established inflammatory root resorption in replanted dog teeth. <i>Endod Dent Traumatol</i> 1995;11:124–8.
89.	Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors: 1—diagnosis of healing complications. <i>Endod Dent Traumatol</i> 1995;11:51–8.

TABLE 8. (Continued)

Ref #	Title
90.	Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors: 2—factors related to pulpal healing. <i>Endod Dent Traumatol</i> 1995;11:59–68.
91.	Andreasen JO, Borum MK, Andreasen FM. Replantation of 400 avulsed permanent incisors: 3—factors related to root growth. <i>Endod Dent Traumatol</i> 1995;11:69–75.
92.	Andreasen, JO, Borum MK, Jacobsen HL, Andreasen, FM. Replantation of 400 avulsed permanent incisors: 4—factors related to periodontal ligament healing. <i>Endod Dent Traumatol</i> 1995;11:76–89.
93.	Krasner P, Rankow HJ. New philosophy for the treatment of avulsed teeth. <i>Oral Surg Oral Med Oral Pathol Oral Radiol Endod</i> 1995;79:616–23.
94.	Sae-Lim V, Wang CY, Choi GW, Trope M. The effect of systemic tetracycline on resorption of dried replanted dogs teeth. <i>Endod Dent Traumatol</i> 1998;14:127–32.
95.	Sae-Lim V, Wang CY, Trope M. Effect of systemic tetracycline and amoxicillin on inflammatory root resorption of replanted dogs teeth. <i>Endod Dent Traumatol</i> 1998;14:216–20.
96.	Kawanami M, Andreasen JO, Borum MK, Schou S, Hjorting-Hansen E, Kato H. Infraposition of ankylosed permanent maxillary incisors after replantation related to age and sex. <i>Endod Dent Traumatol</i> 1999;15:50–6.
97.	Ashkenazi M, Sarnat H, Keila S. In vitro viability, mitogenicity and clonogenic capacity of periodontal ligament cells after storage in six different media. <i>Endod Dent Traumatol</i> 1999;15:149–56.
98.	Yanpiset K, Trope M. Pulp revascularization of replanted immature dog teeth after different treatment methods. <i>Endod Dent Traumatol</i> 2000;16:211–7.
99.	Iqbal MK, Bamaas NS. Effect of enamel matrix derivative (EMDOGAIN®) upon periodontal healing after replantation of permanent incisors in Beagle dogs. <i>Dent Traumatol</i> 2001;17:36–45.
100.	Flores MT, Andreasen JO, Bakland LK. Guidelines for the evaluation and management of traumatic dental injuries. <i>Dent Traumatol</i> 2001;17:193–6.
101.	Trope M. Clinical management of the avulsed tooth: present strategies and future directions. <i>Dent Traumatol</i> 2002;18:1–11.
102.	Recommended guidelines of the American Association of Endodontists for the treatment of traumatic dental injuries. 2004.

TABLE 9. Splinting

Ref #	Title
103.	Andreasen JO. The effect of splinting upon periodontal healing after replantation of permanent incisors in monkeys. <i>Acta Odont Scand</i> 1975;33:313–23.
104.	Neaverth EJ, Goerig AC. Technique and rationale for splinting. <i>J Am Dent Assoc</i> 1980;100:56–63.
105.	Nasjleti CE, Castelli WA, Caffesse RG. The effects of different splinting times on replantation of teeth in monkeys. <i>Oral Surg Oral Med Oral Pathol</i> 1982;53:557–66.
106.	Antrim DD, Ostrowski JS. A functional splint for traumatized teeth. <i>J Endod</i> 1982;8:328–31.
107.	Kehoe JC. Splinting and replantation after traumatic avulsion. <i>J Am Dent Assoc</i> 1986;112:224–30.
108.	Oikarinen K. Functional fixation for traumatically luxated teeth. <i>Endod Dent Traumatol</i> 1987;3:224–8.
109.	Berude JA, Hicks ML, Sauber JJ, Li S. Resorption after physiological and rigid splinting of replanted permanent incisors in monkeys. <i>J Endod</i> 1988;14:592–600.
110.	Cvek M, Andreasen JO, Borum MK. Healing of 208 intraalveolar root fractures in patients aged 7-17 years. <i>Dent Traumatol</i> 2001;17:53–62.

TABLE 10. Pulpal Vitality of Traumatized Teeth

Ref #	Title
111.	Andreasen, JO. Luxation of permanent teeth due to trauma: a clinical and radiographic follow-up study of 189 injured teeth. <i>Scand J Dent Res</i> 1970;78:273–86.
112.	Bhaskar SN, Rappaport HM. Dental vitality tests and pulp status. <i>J Am Dent Assoc</i> 1973;86:409–11.
113.	Barkin PR. Time as a factor in predicting the vitality of traumatized teeth. <i>J Dent Child</i> 1973;40:188–92.
114.	Zadik D, Chosack A, Eidelman E. The prognosis of traumatized permanent anterior teeth with fracture of enamel and dentin. <i>Oral Surg Oral Med Oral Pathol</i> 1979;47:173–5.
115.	Dumsha T, Hovland EJ. Pulpal prognosis following extrusive luxation injuries in permanent teeth with closed apexes. <i>J Endod</i> 1982;8:410–2.
116.	Andreasen FM. Pulpal healing after luxation injuries and root fracture in the permanent dentition. <i>Endod Dent Traumatol</i> 1989;5:111–31.
117.	Andreasen FM, Vestergaard Pedersen B. Prognosis of luxated permanent teeth: the development of pulp necrosis. <i>Endod Dent Traumatol</i> 1985;1:207–20.
118.	Andreasen FM. Histological and bacteriological study of pulps extirpated after luxation injuries. <i>Endod Dent Traumatol</i> 1988;4:170–81.
119.	Feiglin B. Dental pulp response to traumatic injuries: a retrospective analysis with case reports. <i>Endod Dent Traumatol</i> 1996;12:1–8.

TABLE 11. Alternate Methods of Pulp Testing in Traumatized Teeth

Ref #	Title
120.	Gazelius B, Olgart L, Edwall B, Edwall L. Non-invasive recording of blood flow in human dental pulp. <i>Endod Dent Traumatol</i> 1986;2:219–21.
121.	Olgart L, Gazelius B, Lindh-Stromberg U. Laser doppler flowmetry in assessing vitality in luxated permanent teeth. <i>Int Endod J</i> 1988;21:300–6.
122.	Schnettler JM, Wallace JA. Pulse oximetry as a diagnostic tool of pulpal vitality. <i>J Endod</i> 1991;17:488–90.
123.	Oikarinen K, Kopola H, Makiniemi M, Herrala E. Detection of pulse in oral mucosa and dental pulp by means of optical reflection method. <i>Endod Dent Traumatol</i> 1996;12:54–9.

TABLE 12. Treatment of the Intruded Tooth

Ref #	Title
124.	Andreasen JO, Andreasen FM. Intrusion: chapter 16. In: Andreasen JO, Andreasen FM, Andersson L, eds. <i>Textbook and color atlas of traumatic injuries to the teeth</i> . 4th ed. Copenhagen: Blackwell Munksgaard, 2007:428–43.
125.	Jacobsen I. Clinical follow-up study of permanent incisors with intrusive luxation after acute trauma. <i>J Dent Res</i> 1983; 62:486, abstract #37.
126.	Tronstad L, Trope M, Bank M, Barnett F. Surgical access for Endodontic treatment of intruded teeth. <i>Endod Dent Traumatol</i> 1986;2:75–8.
127.	Shapira J, Regev L, Liebfeld H. Re-eruption of completely intruded immature permanent incisors. <i>Endod Dent Traumatol</i> 1986;2:113–6.
128.	Kinirons MJ, Sutcliffe J. Traumatically intruded permanent incisors: a study of treatment and outcome. <i>Brit Dent J</i> 1991;170:144–6.
129.	Mamber EK. Treatment of intruded permanent incisors: a multidisciplinary approach. <i>Endod Dent Traumatol</i> 1994;10: 98–104.
130.	Oulis C, Vadiakas G, Siskos G. Management of intrusive luxation injuries. <i>Endod Dent Traumatol</i> 1996;12:113–9.
131.	Malmgren B, Cvek M, Lundberg M, Frykholm A. Surgical treatment of ankylosed and infrapositioned reimplanted incisors in adolescents. <i>Scan J Dent Res</i> 1984;92:391–9.
132.	Cunha RF, Pavarini A, Percinoto C, Lima JEO. Influence of surgical repositioning of mature permanent dog teeth following experimental intrusion: a histological assessment. <i>Dent Traumatol</i> 2002;18:304–8.
133.	Andreasen JO, Bakland LK, Matras RC, Andreasen FM. Traumatic intrusion of permanent teeth: part 1—an epidemiological study of 216 intruded permanent teeth. <i>Dent Traumatol</i> 2006;22:83–9.
134.	Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth: part 2—a clinical study of the effect of preinjury and injury factors, such as sex, age, stage of root development, tooth location, and extent of injury including number of intruded teeth on 140 intruded permanent teeth. <i>Dent Traumatol</i> 2006;22:90–8.
135.	Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth: part 3—a clinical study of the effect of treatment variables such as treatment delay, method of repositioning, type of splint, length of splinting and antibiotics of 140 teeth. <i>Dent Traumatol</i> 2006;22:99–111.

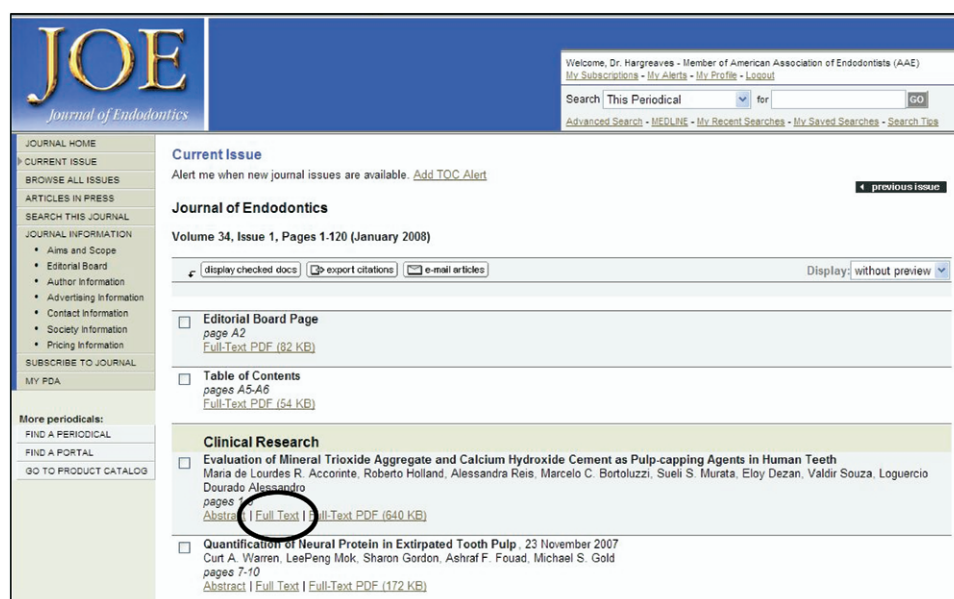



Figure 1. Navigation to HTML version.

References  return to article outline

1. Mestreneur SR, Holland R, Dezan E. Influence of age on the behavior of dental pulp of dog teeth after capping of an adhesive system or calcium hydroxide. *Dent Traumatol*. 2003;19:255–261. [MEDLINE](#) | [CrossRef](#)
2. Pereira JC, Segala AD, Costa CAS. Human pulpal response to direct pulp capping with an adhesive system. *Am J Dent*. 2000;13:139–147. [MEDLINE](#)
3. Costa CAS, Nascimento ABL, Teixeira HM, Fontana UF. Response of human pulps capped with a self-etching adhesive system. *Dent Mater*. 2001;17:230–240. [Abstract](#) | [Full Text](#) | [Full-Text PDF \(2132 KB\)](#) | [MEDLINE](#) | [CrossRef](#)
4. Accorinte MR, Loguericio AD, Reis A, Muench A, Araújo VC. Response of human pulps capped with a bonding agent after bleeding control with menostatic agents. *Oper Dent*. 2005;30:147–155. [MEDLINE](#)

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to review the entire Paper**

Figure 2. Hyperlink to References.

References

1. Glendor E, Marcenes W, Andreasen JO. eds. Classification, epidemiology and etiology: chapter 8. In: Andreasen JO, Andreasen FM, Andersson Leds., eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:217–54.
2. Trope M, Blanco L, Chivian N, Sigurdsson A. The role of endodontics after dental traumatic injuries: chapter 16. In: Cohen S, Hargreaves KM. Pathways of the pulp. 9th ed. St Louis, MO: Mosby/Elsevier, 2006:610–49.
3. Andreasen JO. Challenges in clinical dental traumatology. *Endod Dent Traumatol* 1985;1:45–55.
4. Croll TP, Brooks EB, Schut L, Laurent JP. Rapid neurologic assessment and initial management for the patient with traumatic dental injuries. *J Am Dent Assoc* 1980;100:530–4.
5. Bakland LK, Andreasen JO. Dental traumatology: essential diagnosis and treatment planning. *Endo Topics* 2004;7:14–34.
6. Andreasen FM, Andreasen JO. eds. Crown fractures: chapter 10. Andreasen JO, Andreasen FM, Tsukiboshi M. Crown-root fractures: chapter 11. In: Andreasen JO, Andreasen FM, Andersson Leds., eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:280–336.
7. Rauschenberger CR, Hovland EJ. Clinical management of crown fractures. *Dent Clin North Am* 1995;39:25–51.
8. Patterson SS, Mitchell DF. Calcific metamorphosis of the dental pulp. *Oral Surg Oral Med Oral Pathol* 1965;20:94–101.
9. Holcomb JB, Gregory WB. Calcific metamorphosis of the pulp: its incidence and treatment. *Oral Surg Oral Med Oral Pathol* 1967;24:825–30.
10. Jacobsen I, Kerekes K. Long-term prognosis of traumatized permanent anterior teeth showing calcifying processes in the pulp cavity. *Scand J Dent Res* 1977;85:588–98.
11. Andreasen JO. Luxation of permanent teeth due to trauma. a clinical and radiographic follow-up study of 189 injured teeth. *Scand J Dent Res* 1970;78:273–86.
12. Lundberg M, Cvek M. A light microscopy study of pulps from traumatized permanent incisors with reduced pulpal lumen. *Acta Odontol Scand* 1980;38:89–94.
13. Cvek M, Granath L, Lundberg M. Failures and healing in endodontically treated non-vital anterior teeth with post-traumatically reduced pulpal lumen. *Acta Odontol Scand* 1982;40:223–8.
14. Andreasen FM. Transient apical breakdown and its relation to color and sensibility changes after luxation injuries to teeth. *Endod Dent Traumatol* 1986;2:9–19.
15. Andreasen FM, Yu Z, Thomsen BL, Andersen PK. Occurrence of pulp canal obliteration after luxation injuries in the permanent dentition. *Endod Dent Traumatol* 1987;3:103–15.
16. Schindler WG, Gullickson DC. Rationale for the management of calcific metamorphosis secondary to traumatic injuries. *J Endod* 1988;14:408–12.
17. Akerblom A, Hasselgren G. The prognosis for endodontic treatment of obliterated root canals. *J Endod* 1988;14:565–7.
18. Robertson A, Andreasen FM, Bergenholtz G, Andreasen JO, Noren JG. Incidence of pulp necrosis subsequent to pulp canal obliteration from trauma to permanent incisors. *J Endod* 1996;22:557–60.
19. Amir FA, Gutmann JL, Witherspoon DE. Calcific metamorphosis: a challenge in endodontic diagnosis and treatment. *Quint Internat J* 2001;32:447–55.
20. Toto PD, Restarski JS. The histogenesis of pulpal odontoclasts. *Oral Surg Oral Med Oral Pathol* 1963;16:172–8.
21. Gartner AH, Mack T, Somerlott RG, Walsh, LC. Differential diagnosis of internal and external root resorption. *J Endod* 1976;2:329–34.
22. Frank AL, Weine FS. Nonsurgical therapy for the perforative defect of internal resorption. *J Am Dent Assoc* 1973;87:863–8.
23. Wedenberg C, Zetterqvist L. Internal resorption in human teeth: a histological, scanning electron microscopic, and enzyme histochemical study. *J Endod* 1987;13:255–9.
24. Yaacob HB. The resistant dentine shell of teeth suffering from idiopathic external resorption. *Aust Dent J* 1980;25:73–5.
25. Frank AL. External-internal progressive resorption and its non-surgical correction. *J Endod* 1981;7:473–6.
26. Frank AL, Bakland LK. Nonendodontic therapy for supraosseous extracanal invasive resorption. *J Endod* 1987;13:348–55.
27. Frank AL, Torabinejad M. Diagnosis and treatment of extracanal invasive resorption. *J Endod* 1998;24:500–4.
28. Heithersay GS. Clinical, radiologic, and histopathologic features of invasive cervical resorption. *Quintessence Int* 1999;30:27–37.
29. Heithersay GS. Invasive cervical resorption: an analysis of potential predisposing factors. *Quintessence Int* 1999;30:83–95.
30. Heithersay GS. Treatment of invasive cervical resorption: an analysis of results using topical application of trichloroacetic acid, curettage, and restoration. *Quintessence Int* 1999;30:96–110.
31. Heithersay GS. Invasive cervical resorption. *Endod Topics* 2004;7:73–92.
32. Andreasen JO, Andreasen FM. Root resorption following traumatic dental injuries. *Proc Finn Dent Soc* 1992;88:95–114.
33. Trope M. Root resorption due to dental trauma. *Endod Topics* 2002;1:79–100.
34. Fuss Z, Tsesis I, Lin S. Root resorption: diagnosis, classification and treatment choices based on stimulation factors. *Dental Traumatol* 2003;19:175–82.
35. Andreasen FM, Andreasen JO, Cvek M. eds. Root fractures: chapter 12. In: Andreasen JO, Andreasen FM, Andersson Leds., eds. Textbook and color atlas of traumatic injuries of the teeth. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:337–71.
36. Andreasen JO, Hjorting-Hansen E. Intraalveolar root fractures: radiographic and histologic study of 50 cases. *J Oral Surg* 1967;25:414–26.
37. Michanowicz AE, Michanowicz JP, Abou-Rass M. Cementogenic repair of root fractures. *J Am Dent Assoc* 1971;82:569–79.
38. Cvek M. Treatment of non-vital permanent incisors with calcium hydroxide: IV—periodontal healing and closure of the root canal in the coronal fragment of teeth with intra-alveolar fracture and vital apical fragment: a follow-up. *Odont Revy* 1974;25:239–46.
39. Zachrisson BU, Jacobsen I. Long-term prognosis of 66 permanent anterior teeth with root fracture. *Scand J Dent Res* 1975;83:345–54.
40. Jacobsen I, Zachrisson BU. Repair characteristics of root fractures in permanent anterior teeth. *Scand J Dent Res* 1975;83:355–64.

41. Jacobsen I, Kerekes K. Diagnosis and treatment of pulp necrosis in permanent anterior teeth with root fracture. *Scand J Dent Res* 1980;88:370–6.
42. Andreasen FM, Andreasen JO. Resorption and mineralization processes following root fracture of permanent incisors. *Endod Dent Traumatol* 1988;4:202–14.
43. Andreasen FM, Andreasen JO, Bayer T. Prognosis of root-fractured permanent incisors - prediction of healing modalities. *Endod Dent Traumatol* 1989;5:11–22.
44. Robertson CUJ, Cunningham SA. A one-stage calcific barrier technique in a root-fractured incisor tooth: a case report. *Int Endod J* 1991;24:67–71.
45. Yates JA. Root fractures in permanent teeth: a clinical review. *Int Endod J* 1992;25:150–7.
46. Feiglin B. Clinical management of transverse root fractures. *Dent Clin North Am* 1995;39:53–79.
47. Caliskan MK, Pehlivan Y. Prognosis of root-fractured permanent incisors. *Endod Dent Traumatol* 1996;12:129–36.
48. Cvek M, Andreasen JO, Borum MK. Healing of 208 intraalveolar root fractures in patients aged 7-17 years. *Dent Traumatol* 2001;17:53–62.
49. Cvek M, Mejare I, Andreasen JO. Healing and prognosis of teeth with intra-alveolar fractures involving the cervical part of the root. *Dent Traumatol* 2002;18:57–65.
50. Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures: I—effect of pre-injury and injury factors such as sex, age, stage of root development, fracture type, location of fracture and severity of dislocation. *Dent Traumatol* 2004;20:192–202.
51. Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures: 2—effect of treatment factors such as treatment delay, repositioning, splinting type and period and antibiotics. *Dent Traumatol* 2004;20:203–11.
52. Cvek M, Mejare I, Andreasen JO. Conservative endodontic treatment of teeth fractured in the middle or apical part of the root. *Dent Traumatol* 2004;20:261–9.
53. Andreasen JO, Andreasen FM. *Avulsions: chapter 17*. In: Andreasen JO, Andreasen FM, Andersson Leds., eds. *Textbook and color atlas of traumatic injuries to the teeth*. 4th ed. Copenhagen: Blackwell Munksgaard, 2007: 444–88.
54. Andreasen JO, Hjorting-Hansen E. Replantation of teeth: I—radiographic and clinical study of 110 human teeth replanted after accidental loss. *Acta Odontol Scand* 1966;24:263–86.
55. Andreasen JO, Hjorting-Hansen E. Replantation of teeth: II—histological study of 22 replanted anterior teeth in humans. *Acta Odontol Scand* 1966;24:287–306.
56. Cvek M, Granath LE, Hollender L. Treatment of non-vital permanent incisors with calcium hydroxide: III—variation of occurrence of ankylosis of reimplanted teeth with duration of extra-alveolar period and storage environment. *Odont Revy* 1974;25:43–56.
57. Andreasen JO. Periodontal healing after replantation of traumatically avulsed human teeth: assessment by mobility testing and radiography. *Acta Odontol Scand* 1975;33:325–35.
58. Andreasen JO, Reinholdt J, Riis I, Dybdahl R, Soder PO, Otteskog P. Periodontal and pulpal healing of monkey incisors preserved in tissue culture before replantation. *Int J Oral Surg* 1978;7:104–12.
59. Rothstein RJ, Baker EJ. Tetanus: prevention and treatment. *JAMA* 1978;240:675–6.
60. Andreasen JO. Analysis of topography of surface and inflammatory root resorption after replantation of mature permanent incisors in monkeys. *Swed Dent J* 1980;4:135–44.
61. Oswald RJ, Harrington GW, Van Hassel HJ. Replantation: 1—the role of the socket. *J Endod* 1980;6:479–84.
62. Van Hassel HJ, Oswald RJ, Harrington GW. Replantation: 2—the role of the periodontal ligament. *J Endod* 1980;6:506–8.
63. Oswald RJ, Harrington GW, Van Hassel HJ. A postreplantation evaluation of air-dried and saliva-stored avulsed teeth. *J Endod* 1980;6:546–51.
64. Andreasen JO, Kristerson L. The effect of limited drying or removal of the periodontal ligament: periodontal healing after replantation of mature permanent incisors in monkeys. *Acta Odontol Scand* 1981;39:1–13.
65. Tronstad L, Andreasen JO, Hasselgren G, Kristerson L, Riis I. pH changes in dental tissues after root canal filling with calcium hydroxide. *J Endod* 1981;7:17–21.
66. Andreasen JO. The effect of pulp extirpation or root canal treatment on periodontal healing after replantation of permanent incisors in monkeys. *J Endod* 1981;7:245–52.
67. Andreasen JO. Relationship between surface and inflammatory resorption and changes in the pulp after replantation of permanent incisors in monkeys. *J Endod* 1981;7:294–301.
68. Skoglund A, Tronstad L. Pulpal changes in replanted and autotransplanted immature teeth in dogs. *J Endod* 1981;7:309–16.
69. Andreasen JO, Kristerson L. The effect of extra-alveolar root filling with calcium hydroxide on periodontal healing after replantation of permanent incisors in monkeys. *J Endod* 1981;7:349–54.
70. Andreasen JO. Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. *Int J Oral Surg* 1981;10:43–53.
71. Matsson L, Andreasen J, Cvek M, Granath L. Ankylosis of experimentally reimplanted teeth related to extra-alveolar period and storage environment. *Pediatric Dent* 1982;4:327–9.
72. Blomlof L, Lindsog S, Andersson L, Hedstrom KG, Hammarstrom L. Storage of experimentally avulsed teeth in milk prior to replantation. *J Dent Res* 1983;62:912–6.
73. Blomlof L, Andersson L, Lindsog S, Kedstrom K, Hammerstrom L. Periodontal healing of replanted monkey teeth prevented from drying. *Acta Odontol Scand* 1983;41:117–23.
74. Andersson L, Blomlof L, Lindsog S, Feiglin B, Hammarstrom L. Tooth ankylosis: clinical, radiographic and histological assessments. *Int J Oral Surg* 1984;13:423–31.
75. Klinge B, Nilveus R, Selvig KA. The effect of citric acid on repair after delayed tooth replantation in dogs. *Acta Odontol Scand* 1984;42:351–9.
76. Lindsog S, Pierce AM, Blomlof L, Hammarstrom L. The role of the necrotic periodontal membrane in cementum resorption and ankylosis. *Endod Dent Traumatol* 1985;1:96–101.
77. Hammarstrom L, Blomlof L, Feiglin B, Andersson L, Lindsog S. Replantation of teeth and antibiotic treatment. *Endod Dent Traumatol* 1986;2:51–7.
78. Kling M, Cvek M, Mejare I. Rate and predictability of pulp revascularization in therapeutically reimplanted permanent incisors. *Endod Dent Traumatol* 1986;2:83–9.
79. Bjorvatn K, Selvig KA, Klinge B. Effect of tetracycline and SnF₂ on root resorption in replanted incisors in dogs. *Scand J Dent Res* 1989;97:477–82.
80. Selvig KA, Bjorvatn K, Claffey N. Effect of stannous fluoride and tetracycline on repair after delayed replantation of root-planed teeth in dogs. *Acta Odontol Scand* 1990;48:107–12.
81. Andersson L, Bodin I. Avulsed human teeth replaced within 15 minutes: a long-term clinical follow-up study. *Endod Dent Traumatol* 1990;6:37–42.
82. Cvek M, Cleaton-Jones P, Austin J, Lowrie J, Kling M, Fatti P. Pulp revascularization in reimplanted immature monkey incisors: predictability and the effect of antibiotic systemic prophylaxis. *Endod Dent Traumatol* 1990;6:157–69.
83. Cvek M, Cleaton-Jones P, Austin J, Kling M, Lowrie J, Fatti P. Effect of topical application of doxycycline on pulp revascularization and periodontal healing in reimplanted monkey incisors. *Endod Dent Traumatol* 1990;6:170–6.
84. Hiltz J, Trope M. Vitality of human lip fibroblasts in milk, Hanks balanced salt solution and Viaspan Storage media. *Endod Dent Traumatol* 1991;7:69–72.
85. Trope M, Friedman S. Periodontal healing of replanted dog teeth stored in Viaspan, Milk, and Hank's balanced salt solution. *Endod Dent Traumatol* 1992;8:183–8.
86. Trop M, Yesilsoy C, Koren L, Moshonov J, Friedman S. Effect of different endodontic treatment protocols on periodontal repair and root resorption of replanted dog teeth. *J Endod* 1992;18:492–6.
87. Krasner P, Person P. Preserving avulsed teeth for replantation. *J Am Dent Assoc* 1992;123:80–8.
88. Trope M, Moshonov J, Nissan R, Buxt P, Yesilsoy C. Short vs long-term calcium hydroxide treatment of established inflammatory root resorption in replanted dog teeth. *Endod Dent Traumatol* 1995;11:124–8.
89. Andreasen JO, Borum MK, Jacobsen HL, Andreasen F. Replantation of 400 avulsed permanent incisors: 1—diagnosis of healing complications. *Endod Dent Traumatol* 1995;11:51–8.
90. Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors: 2—factors related to pulpal healing. *Endod Dent Traumatol* 1995;11:59–68.
91. Andreasen JO, Borum MK, Andreasen FM. Replantation of 400 avulsed permanent incisors: 3—factors related to root growth. *Endod Dent Traumatol* 1995;11:69–75.
92. Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors: 4—factors related to periodontal ligament healing. *Endod Dent Traumatol* 1995;11:76–89.
93. Krasner P, Rankow HJ. New philosophy for the treatment of avulsed teeth. *Oral Surg Oral Med Oral Pathol Radiol Endod* 1995;79:616–23.
94. Sae-Lim V, Wang CY, Choi GW, Trope M. The effect of systemic tetracycline on resorption of dried replanted dogs teeth. *Endod Dent Traumatol* 1998;14:127–32.
95. Sae-Lim V, Wang CY, Trope M. Effect of systemic tetracycline and amoxicillin on inflammatory root resorption of replanted dogs teeth. *Endod Dent Traumatol* 1998;14:216–20.
96. Kawanami M, Andreasen JO, Borum MK, Schou S, Hjorting-Hansen E, Kato H. Infraosition of ankylosed permanent maxillary incisors after replantation related to age and sex. *Endod Dent Traumatol* 1999;15:50–6.
97. Ashkenazi M, Sarnat H, Keila S. In vitro viability, mitogenicity and clonogenic capacity of periodontal ligament cells after storage in six different media. *Endod Dent Traumatol* 1999;15:149–56.
98. Yanpiset K, Trope M. Pulp revascularization of replanted immature dog teeth after different treatment methods. *Endod Dent Traumatol* 2000;16:211–7.

99. Iqbal MK, Bamaas NS. Effect of enamel matrix derivative (EMDOGAIN®) upon periodontal healing after replantation of permanent incisors in Beagle dogs. *Dent Traumatol* 2001;17:36–45.
100. Flores MT, Andreasen JO, Bakland LK. Guidelines for the evaluation and management of traumatic dental injuries. *Dent Traumatol* 2001;17:193–6.
101. Trope M. Clinical management of the avulsed tooth: present strategies and future directions. *Dent Traumatol* 2002;18:1–11.
102. Recommended guidelines of the American Association of Endodontists for the treatment of traumatic dental injuries. Chicago, IL: American Association of Endodontists, 2004.
103. Andreasen JO. The effect of splinting upon periodontal healing after replantation of permanent incisors in monkeys. *Acta Odont Scand* 1975;33:313–23.
104. Neaverth EJ, Goerig AC. Technique and rationale for splinting. *J Am Dent Assoc* 1980;100:56–63.
105. Nasjleti CE, Castelli WA, Caffesse RG. The effects of different splinting times on replantation of teeth in monkeys. *Oral Surg Oral Med Oral Pathol* 1982;53:557–66.
106. Antrim DD, Ostrowski JS. A functional splint for traumatized teeth. *J Endod* 1982;8:328–31.
107. Kehoe JC. Splinting and replantation after traumatic avulsion. *J Am Dent Assoc* 1986;112:224–30.
108. Oikarinen K. Functional fixation for traumatically luxated teeth. *Endod Dent Traumatol* 1987;3:224–8.
109. Berude JA, Hicks ML, Sauber JJ, Li S. Resorption after physiological and rigid splinting of replanted permanent incisors in monkeys. *J Endod* 1988;14:592–600.
110. Cvek M, Andreasen JO, Borum MK. Healing of 208 intraalveolar root fractures in patients aged 7–17 years. *Dent Traumatol* 2001;17:53–62.
111. Andreasen JO. Luxation of permanent teeth due to trauma: a clinical and radiographic follow-up study of 189 injured teeth. *Scand J Dent Res* 1970;78:273–86.
112. Bhaskar SN, Rappaport HM. Dental vitality tests and pulp status. *J Am Dent Assoc* 1973;86:409–11.
113. Barkin PR. Time as a factor in predicting the vitality of traumatized teeth. *J Dent Child* 1973;40:188–92.
114. Zadik D, Chosack A, Eidelman E. The prognosis of traumatized permanent anterior teeth with fracture of enamel and dentin. *Oral Surg Oral Med Oral Pathol* 1979;47:173–5.
115. Dumsha T, Hovland EJ. Pulpal prognosis following extrusive luxation injuries in permanent teeth with closed apices. *J Endod* 1982;8:410–2.
116. Andreasen FM. Pulpal healing after luxation injuries and root fracture in the permanent dentition. *Endod Dent Traumatol* 1989;5:111–31.
117. Andreasen FM, Vestergaard Pedersen B. Prognosis of luxated permanent teeth: the development of pulp necrosis. *Endod Dent Traumatol* 1985;1:207–20.
118. Andreasen FM. Histological and bacteriological study of pulps extirpated after luxation injuries. *Endod Dent Traumatol* 1988;4:170–81.
119. Feiglin B. Dental pulp response to traumatic injuries: a retrospective analysis with case reports. *Endod Dent Traumatol* 1996;12:1–8.
120. Gazelius B, Olgart L, Edwall B, Edwall L. Non-invasive recording of blood flow in human dental pulp. *Endod Dent Traumatol* 1986;2:219–21.
121. Olgart L, Gazelius B, Lindh-Stromberg U. Laser doppler flowmetry in assessing vitality in luxated permanent teeth. *Int Endod J* 1988;21:300–6.
122. Schnettler JM, Wallace JA. Pulse oximetry as a diagnostic tool of pulpal vitality. *J Endod* 1991;17:488–90.
123. Oikarinen K, Kopola H, Makiniemi M, Herrala E. Detection of pulse in oral mucosa and dental pulp by means of optical reflection method. *Endod Dent Traumatol* 1996;12:54–9.
124. Andreasen JO, Andreasen FM. Intrusion: chapter 16. In: Andreasen JO, Andreasen FM, Andersson L, eds *Textbook and color atlas of traumatic injuries to the teeth*. 4th ed. Copenhagen: Blackwell Munksgaard, 2007:428–43.
125. Jacobsen I. Clinical follow-up study of permanent incisors with intrusive luxation after acute trauma. *J Dent Res* 1983;62:486, abstract #37.
126. Tronstad L, Trope M, Bank M, Barnett F. Surgical access for endodontic treatment of intruded teeth. *Endod Dent Traumatol* 1986;2:75–8.
127. Shapira J, Regev L, Liebfeld H. Re-eruption of completely intruded immature permanent incisors. *Endod Dent Traumatol* 1986;2:113–6.
128. Kinirons MJ, Sutcliffe J. Traumatically intruded permanent incisors: a study of treatment and outcome. *Brit Dent J* 1991;170:144–6.
129. Mamber EK. Treatment of intruded permanent incisors: a multidisciplinary approach. *Endod Dent Traumatol* 1994;10:98–104.
130. Oulis C, Vadiakas G, Siskos G. Management of intrusive luxation injuries. *Endod Dent Traumatol* 1996;12:113–9.
131. Malmgren B, Cvek M, Lundberg M, Frykholm A. Surgical treatment of ankylosed and infra-positioned reimplanted incisors in adolescents. *Scan J Dent Res* 1984;92:391–9.
132. Cunha RF, Pavarini A, Percinoto C, Lima JEO. Influence of surgical repositioning of mature permanent dog teeth following experimental intrusion: a histological assessment. *Dent Traumatol* 2002;18:304–8.
133. Andreasen JO, Bakland LK, Matras RC, Andreasen FM. Traumatic intrusion of permanent teeth: part 1—an epidemiological study of 216 intruded permanent teeth. *Dent Traumatol* 2006;22:83–9.
134. Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth: part 2—a clinical study of the effect of preinjury and injury factors, such as sex, age, stage of root development, tooth location, and extent of injury including number of intruded teeth on 140 intruded permanent teeth. *Dent Traumatol* 2006;22:90–8.
135. Andreasen JO, Bakland LK, Andreasen FM. Traumatic intrusion of permanent teeth: part 3—a clinical study of the effect of treatment variables such as treatment delay, method of repositioning, type of splint, length of splinting and antibiotics of 140 teeth. *Dent Traumatol* 2006;22:99–111.