Dear Readers,

The fact that oral health of children has improved over the past decades in industrialized countries confirms that the strategy of promoting early preventive measures already pays off. However, there is still a need for action: Children with a particularly high caries risk, often coming from low-income families, have to be addressed more effectively. In addition, it is important to spread the knowledge about clinically proven and scientifically tested concepts, procedures and treatment techniques which are adapted to the specific needs of children.

This was the tenor of the 12th Congress of the European Academy of Paediatric Dentistry that took place in Sopot (Poland) in June 2014. Being aware of the importance of this event, 3M ESPE organized two different sessions: A pre-congress course focusing on pain control in children with medical conditions and a symposium on the management of caries defects in paediatric patients. Both sessions attracted wide interest among the participants from around the world.

In order to make sure that you are given the opportunity to benefit from the presentations of the renowned lecturers, we have compiled the most important facts in this issue of the Expertise Magazine. It contains interviews with and articles of the lecturers as well as case reports authored by paediatric dentists.

Enjoy reading!

Gerhard Kultermann, Editor
3M ESPE, Seefeld, Germany

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Paediatric dentistry at 3M ESPE

Supporting dentists in providing high-quality dental care to children

Frédéric van Vliet, 3M ESPE, Seefeld, Germany

Interview with Susanne Mohr, European Marketing Manager WE at 3M ESPE Dental Products in Seefeld, Germany.

Mrs. Mohr, 3M ESPE is currently laying a stronger focus on paediatric dentistry. What is the reason for this?

Paediatric dentistry is an extremely important discipline: It is decisive to start teaching techniques of prevention and dental care at an early age already to set the course for maintaining teeth for a lifetime. In this context, children and their parents need a lot of teaching and information. When caries starts to develop, specific materials and techniques are required to restore the primary dentition, which is important for proper jaw development and healthy permanent teeth. The relevance of the discipline is increasingly being recognized by dental journals and practitioners as well, considering e.g. the growing number of specialist practices that were founded in countries like Germany lately.

Firstly, we offer complete procedure solutions for paediatric dentistry which are developed in close collaboration with paediatric dentists and academies. For example, the 3M™ ESPE™ Clinpro™ family is comprised of various products for prevention in the dental office and suited especially for kids: Polishing paste and powder, fluoride varnishes, a lactic acid indicator swab to assess the caries risk, fissure sealant etc. are included. For restorative treatment, transparent strip crown forms and stainless steel crowns are available with complementing products. The 3M™ ESPE™ Strip Crown Forms may be trimmed with specific crown scissors and filled with 3M™ ESPE™ Filtek™ Supreme XTE Universal Restorative (preferably using the shades A1B, A2B, WB and XWB). 3M™ ESPE™ Scotchbond™ Universal Adhesive is suited for bonding. Secondly, we support general practitioners by providing information on techniques and procedures.

Where can this information be obtained?

Apart from several expert articles and case reports compiled in this issue of the Espertise™ Magazine, videos and brochures, a specific paediatric dentistry webpage is currently being created as a part of the Dental Education Knowledge Base. This platform contains recommendations regarding different treatment procedures, practical advice and clinical examples. We believe that practical information on paediatric dentistry is especially important, since the specific techniques are not part of the general curriculum at university. Their use, however, may contribute decisively to more efficient, child-oriented procedures in every dental office. These may be further optimized by enhancing the child’s compliance. Information about paediatric procedures will soon be available at the Dental Education Knowledge Base: www.3MESPE.co.uk/DentalEducation.

Are there any tools offered by 3M ESPE that help enhance the compliance of paediatric patients?

Yes, we offer supporting tools like 3M™ Post-it™ Notes with a scheme of the primary dentition on them. The dentist can mark the areas which need additional attention during tooth brushing at home. The note may then be fixed on the mirror in the bathroom as a reminder. In addition, bravery certificates are available and may be handed out to fearless kids after successful treatment.

Susanne Mohr

Bravery certificates for girls and for boys.
Paediatric dentistry in the United States

Our aim is to provide gentle and compassionate dental care!

Richard J. Baylon, St. Paul, Minnesota

Children are different from adults in many respects: They think, feel and behave differently, and the development of their brain and body is not yet completed. In order to offer targeted, highest standard oral care to this patient group, it is thus highly important to understand the specific stages of physical and psychological growth and development. The dentist has to know about and understand the reasons for a patient’s age-specific behaviour to be able to react properly and guide the child’s behaviour. In addition, he or she has to be informed about possible medical conditions that may be present in children to make certain that an appropriate treatment plan is selected. And finally, the special characteristics and differences in the tooth structure require specific treatment techniques especially in prevention and restorative dentistry.

Today, there are four private dental offices in the suburban area around St. Paul, all of which are managed by four partners and two employee dentists who will most likely become partners.

Office organization

We are organized in a way that every dentist works at all four locations, rotating according to a predetermined schedule. Our clinical teams travel with us, while the administrative staff members always remain in the same place. All dentists have their own patients and we put an emphasis on a high doctor-patient consistency of care. However, in the event of an emergency, another partner may take over. This structure, which evolved over time as the patient base and the number of partners grew, is greatly facilitated by electronic dental records. They revolutionized information transfer and inter-office communication, which is vital with our model of practice organization.

Unique model for care

This model is quite unique. In most practices of paediatric dentistry, there are few or no dental hygienists and the schedules are very tight. As a consequence, the time spent for each child is restricted, even in cases of difficult behaviour. Often, the result is that restraints or medical immobilization devices are used on those patients, which is a measure that is never carried out in our dental practices. Instead, we take our time to cultivate the interest of children and offer gentle and compassionate dental care. In cases of medical necessity, we admit our patients to the Children’s Hospital for treatment under general anaesthesia. The attention given to our patients in such a special paediatric medical setting ensures a kind and caring transition back to our private clinics. And our success proves us right! Several of my former patients have chosen dentistry as their career and many of them come to my practice again with their own children.

Contact

Richard J. Baylon, DDS, rbaylon1@me.com
Developing strategies to improve oral health in children

Susanne Mohr, 3M ESPE, Seefeld, Germany

In June 2014, the 12th Congress of the European Academy of Paediatric Dentistry took place in Sopot, Poland. Following this event, the president of the EAPD, Prof. Monty Duggal BDS, MDsc, FDS (Paeds), RCS (Eng), PhD summarized the most important results for us and provided insight into the activities of the organization. Prof. Duggal is currently Professor of Paediatric Dentistry and Head of the Paediatric Dentistry Department at Leeds University School of Dentistry.

Prof. Monty Duggal during the 12th Congress of the EAPD.

The EAPD is an organization that was founded in 1989 with the aim of advancing the specialty of paediatric dentistry in Europe for the benefit of improved oral health care for children and adolescents. This goal is pursued by promoting research and enabling knowledge exchange of specialists. In addition, the academy is actively involved not only in the development but also in the delivery of programmes of continuing education in the field of paediatric dentistry. For the purpose of advanced education, specialist articles and guidelines on the basis of clinical and scientific evidence are published.

There are numerous paediatric dentistry organizations worldwide that follow the objectives of encouraging research and contributing to progress in dentistry for children. What is the difference between these organizations and the EAPD?

Would you please describe how the knowledge that is generated by individuals who play an active part within the EAPD is spread?

There are two very important events which are organized by the EAPD for this purpose. The Congress of the European Academy of Paediatric Dentistry takes place every two years and was organized in June 2014 for the 12th time. On this occasion, approximately 680 members and individuals interested in paediatric dentistry seized the opportunity to obtain in-depth-information about the latest developments in the field. Different sessions typically focus on prevention of dental disease, appropriate treatment strategies and specifically oral health care for children with illnesses. As speakers, experts from all over the world are invited because we want to cover the entire spectrum of dental research and practical experience that brings important insights into paediatric dentistry. The congress is very well received due to the high scientific quality of the lectures and its global impact. In the interim year, a seminar is always organized to develop European guidelines – the focus will be on recommen-
dations for the management of early carious lesions in 2015.

What are the most important trends in paediatric dentistry identified on this year’s meeting?

There are lots of important trends in paediatric dentistry, but two are especially important and thus worth mentioning: The first is the striving for early diagnosis and minimally-invasive treatment of tooth decay in children. There is a clear tendency to start with preventive measures very early in life, support non-operative treatment and use materials and devices which allow for defect-oriented preparation and restoration. The second is the understanding of the social and economical factors that have an effect on dental disease. For example, individuals with socio-economically deprived backgrounds as well as migrants are much more likely to be affected by early childhood caries than children from middle-class backgrounds. Thus, we have to see what can be done to improve the situation especially for the high-risk groups.

Are there any suitable strategies to solve this problem?

We have to take social responsibility and approach the high-risk groups actively to break through the barriers of dental care. Waiting for these patients to visit our dental practice without an obvious reason is not a solution. Instead, we should integrate oral health assessment and education for improved oral hygiene into public health programmes. Some countries like Greece, Scotland, England and Germany have already implemented school-based or community-based oral health programmes and agree that they should be incorporated in general health promotion. However, it is also evident that changing oral health behaviour is a challenging task that takes time.

In what way does 3M ESPE support the latest trends with its products and services?

3M ESPE offers a whole range of products and services that support the paediatric dentist in his striving for long-term maintenance of oral health in children. On the one hand, the Clinpro™ family of products for professional tooth cleaning is an effective tool for preventing caries and managing early decay. On the other hand, there are products for restorative procedures that ensure long-term stability and good outcomes. For example, I have been using 3M™ ESPE™ Stainless Steel Crowns for full coverage restorations for many years. I am convinced that these products offer an additional value in paediatric dentistry. Since in the future, increased aesthetic demands will have to be addressed even in paediatric dentistry, I hope that a pre-formed, tooth-coloured crown will be available soon that offers high stability despite thin walls and has a tooth-like appearance.

What is your personal opinion regarding the current achievements and future tasks for the European Academy of Paediatric Dentistry?

In Europe, children have never enjoyed better dental health than they do now, which is an achievement. However, there are still strong inequalities in the provision of oral health care that need to be addressed. It will be the task of the EAPD to help develop community-based oral health programmes and evaluate their effect on high-risk groups, collect information from different countries and learn from the experience of others to finally succeed in further improving the oral health of the European paediatric population.

Prof. Duggal, thank you very much.

Contact

Professor Monty Duggal BDS, MDSc, FDS (Paeds), RCS (Eng), PhD
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There are many different pre-existing conditions that may be found in children. They range from simple and common infections, childhood diseases and allergies to metabolic disorders and genetic syndromes. What is also likely to occur are allergies, immune deficiencies, epilepsy, handicaps, neoplastic diseases and cardiovascular, bleeding or respiratory disorders. Furthermore, the number of children with obesity and psychic disorders is continuously increasing. Last but not least, there are paediatric patients suffering from drug abuse or child abuse and neglect.

Since patients with diseases may react differently to stress during dental treatment and to local anaesthetic administration etc., it is important to identify any disease: Even a standard treatment might pose a risk to these children. When the dentist knows what he will have to deal with, the treatment can be planned accordingly. However, an illness may be dangerous not only for the affected patient, but also for the dental staff and other patients e.g. if there is a risk of infection. Therefore, it is the role of the dentist to help for correct and early diagnosis and thus contribute to a lower incidence of complications.

Disease identification

In order to be well-prepared for the subsequent appointments including dental treatment, literature and the internet may serve as valuable sources of information. If a rare disease is mentioned e.g. by a parent, the website www.orpha.net may be useful. Here, a short description of various diseases and additional detailed information is provided – often even in different languages.

Some diseases, like leukaemia – the most common cancer in children and adolescents – are usually well-known. Possible symptoms include hyperplasia of gingiva and papillae, intramucosal bleeding, foetor ex ore, ulcerations, mucositis and secondary infections such as candida. As soon as oral manifestations of this or any other systemic disease are present, the child should be referred to a paediatrician. If an infectious childhood illness like scarlet fever – characterized by a sore throat, a rash and high temperature – is identified, the dentist has to react immediately and should not treat the child.
Other illnesses are not as easily identifiable so that support may be required to analyse the clinical situation. For this purpose, a specific platform has been developed: www.stomatopedia.com, the colour atlas of oral diseases in children and adolescents. If symptoms or clinical signs of an illness are present, the actual situation can be compared to clinical images which are available on this new website. It has been set up in the context of a project of the universities of Zurich, Glasgow and Sydney.

Treatment and pain management

The decisions of how to react, whether a dental treatment is appropriate immediately, whether local anaesthesia administration is safe and what precautions must be taken prior to an oral treatment are strongly dependent on the type of disease that is present. Children with obesity, for example, are typically less cooperative during oral examination and treatment and suffer from systemic diseases more frequently. Since there are some hints that obese children are more susceptible to caries, adjusted prevention schemes might be appropriate.

For evaluation of the peri-operative risk prior to the selection of an anaesthetic agent and technique, the ASA (American Society of Anesthesiologists) classification is available. According to this classification, the operative risk is a combination of the physical status of the patient, the physiological derangement the planned procedure will cause, the skills and experience of the operator and the anaesthesiologist and the physiological support service that is offered in the peri-operative period. However, it must be taken into account that these are not the only predictors of a risk.

Summary

Against the background of numerous different diseases which may affect the health of paediatric patients, dental practitioners need to take every possible measure to identify any pre-existing condition. At this, a close collaboration with the paediatrician and the use of additional sources of information is advisable. Based on profound knowledge about the physical and psychic condition of a child, appropriate strategies of treatment and pain control can be selected.

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The new platform www.stomatopedia.com supports dental practitioners in identifying oral diseases in paediatric patients (screenshot provided by Dr. Richard Steffen).

ASA PS classification 1 (1941)

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>no systemic disturbance</td>
</tr>
<tr>
<td>Class 2</td>
<td>moderate and definite systemic disturbance either pre-existing or caused by the condition that is to be treated by surgical intervention</td>
</tr>
<tr>
<td>Class 3</td>
<td>severe systemic disturbance</td>
</tr>
<tr>
<td>Class 4</td>
<td>extreme systemic disturbance [that are] an eminent threat to life regardless of the type of treatment</td>
</tr>
<tr>
<td>Class 5</td>
<td>emergency surgery in patients that would otherwise be graded in class 1 or 2</td>
</tr>
<tr>
<td>Class 6</td>
<td>emergency surgery in patients that would otherwise be graded in class 3 or 4</td>
</tr>
<tr>
<td>Class 7</td>
<td>was added at a later date – a moribund patient not expected to survive 24 hours with or without an operation</td>
</tr>
</tbody>
</table>


| ASA PS 1     | normal healthy patients                                                     |
| ASA PS 2     | patients with mild systemic disease                                         |
| ASA PS 3     | patients with severe systemic disease                                       |
| ASA PS 4     | patients with severe systemic disease that is a constant threat to life    |
| ASA PS 5     | moribund patients who or not expected to survive without the operation     |
| ASA PS 6     | a declared brain-dead patient whose organs are being removed for donor purposes |

How to select a risk-oriented procedure

Norbert Krämer, Giessen, Germany

In order to provide for a successful dental treatment of children with chronic health conditions, a systematic approach is required. The general practitioner needs to collect detailed information about the pre-existing conditions and the oral health status to decide what kind of treatment is necessary. Only in this way can he select an adequate treatment strategy and method of pain control.

Chronic health conditions

A chronic health condition is described as a disorder on a biological, physiological or cognitive basis with a duration of at least twelve months. Five different patterns of chronic health conditions can be identified: The first is a permanent condition that manifests consequences in a consistent and unchanging way. An example for this pattern is cerebral palsy, as shown below. The second pattern, recovery, is a condition in which the intensity and duration of symptoms and sequelae improve gradually or resolve, as may be the case with asthma, epilepsy or leukaemia. Pattern number three, deteriorating course, describes a condition like aplastic anaemia or cystic fibrosis that deteriorates for years or decades. The fourth pattern is episodic, with recurrent periods of disease activity alternating with symptom-free periods. Juvenile rheumatoid arthritis is an example. The last pattern is that of a condition that is diagnosed before symptoms are expressed, such as HIV and hypercholesterolemia.

Medical history

For identification of a chronic health condition and to lay the foundation for an adequate, risk-oriented dental treatment, the dentist needs to take the medical history. This should include asking about the concerns of the child and the parent or caregiver, the general medical history, the family history and the dental history of the child. After wards, the general practitioner should look for symptoms like pain, swelling, pulpal sensitivity or excessive bleeding at exposure. At this point already, he will have an idea about the compliance of patient and parents.

Clinical examination

What should follow is a complex intraoral examination. The dental practitioner has to examine the mucosa, soft tissue, jaw bone and teeth and should check on the saliva and oral hygiene. It is also important to evaluate the dental development and watch for structural and dento-facial anomalies. As a last step, the gingival and periodontal ligaments have to be examined.

Apart from an additional extraoral examination, radiographs should be taken on a regular basis. The X-rays are important for the judgment of caries progression, the evaluation of physiological or pathological changes, the visualization of permanent teeth prior to their eruption and the determination of the distance between pulp and cavity. Regarding the frequency of taking radiographs, age-specific recommendations are available: It is suggested that an annual X-ray is taken for children at high caries risk and a two to four-year interval (depending on the age) is sufficient for those with a low caries risk. However, a more individual schedule is required.

Diagnosis

Caries is the most common dental disease in children. For an accurate diagnosis, three different types of early childhood caries have been distinguished: ECC type I is a mild to moderate form that is characterized by isolated carious lesions. In the moderate to severe form, ECC type II, several labial and palatal lesions are found in the maxillary teeth. The most severe form is ECC type III, where almost all teeth are affected in the mandible and maxilla.

... with cerebral palsy and gingival overgrowth.

5-year-old patient with ECC type I.

2-year-old child with ECC type II.

Five-year-old girl …
Diagnostic criteria used to classify pulpal conditions are shown below. With the aid of these and similar classifications, an accurate diagnosis is facilitated and an adequate intervention can be chosen.

**Sedation**

Generally, the dental treatment can be carried out under local anaesthesia, sedation in combination with local anaesthesia or general anaesthesia. Sedation using midazolam may be reasonable in the context of routine treatments, although the risk of side effects (e.g. heart arrhythmia) has to be calculated. The sedative may be administered orally, rectally or intravenously, with a recommended dosage of 0.6 mg/kg body weight. The treatment including local anaesthesia administration should start after 1 to 30 minutes.

**General anaesthesia**

Treatment under general anaesthesia may be necessary in children with a lack of physical and / or mental ability to cooperate and in cases of severe management problems due to a genuine psychiatric disorder of the patient. In addition, general anaesthesia is indicated when there is a need for an extensive and / or complicated treatment in children and adolescents with a lack of coping ability.

In contrast, this strategy of pain control must not be selected for a cooperative patient with minimal need for treatment, in patients with respiratory restriction or upon request. A language and communication problem between the dentist and the patient also does not justify a treatment under general anaesthesia. In any case, it must be considered that complex medical equipment is necessary for general anaesthesia. The risk factors, possible side effects and benefits have to be calculated in each individual situation.

**Informing the patient**

Before starting the intervention, patient and parents have to be informed about the every possible risk. A written consent is obligatory and medical counselling absolutely necessary. Within the framework of a procedure carried out under general anaesthesia, it is important to explain that it might be necessary e.g. to extract more teeth than originally planned: A complete intraoral examination may be possible only when the child is anaesthetized. The following reasons may justify an extraction under general anaesthesia:

- Damage of the tooth without possibility to restore
- Apical periodontitis
- Infected necrosis
- Multi-step or temporary treatment
- Complex root-canal treatments (microscopic)
- Abscess, fistulation
- Uncertain prognosis of the therapeutic measure

**Treatment and prevention**

Finally, the risk-oriented intervention may be executed. In order to lay the foundation for successful maintenance of the oral condition that was obtained due to the treatment, a suitable prevention concept should be developed and carried out.

**Diagnostic criteria for the identification of pulpal conditions**

<table>
<thead>
<tr>
<th>Partial pulpsitis</th>
<th>Total pulpsitis</th>
<th>Pulp necrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased mobility</td>
<td>-</td>
<td>+/-</td>
</tr>
<tr>
<td>Tenderness on percussion</td>
<td>-</td>
<td>+/-/?</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>+/-/?</td>
<td>+/-</td>
</tr>
<tr>
<td>X-ray, pathologic changes</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Excessive bleeding</td>
<td>-</td>
<td>+/-/?</td>
</tr>
<tr>
<td>Toothache</td>
<td>+/-/?</td>
<td>+/-</td>
</tr>
</tbody>
</table>

*Example of ECC type III …*  
In a 2.5-year-old child.

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**References**

Pain management in paediatric patients may be regarded as a particularly challenging task: Pain is a subjective sensory and emotional experience under cognitive influence – an accurate measurement is almost impossible. An assessment is further complicated since young children are unable to communicate pain verbally. Cognitive evaluation is different in this patient group. There are individuals who show a tendency toward catastrophizing and experience more intense pain and increased stress often leading to anxiety. Therefore, it is decisive that a dentist knows how to recognize and anticipate painful situations in children in order to treat them and – if possible – prevent them. For this purpose, a pain assessment tool like the one shown below may be useful.

Pain management in dentistry

Depending on the physical and psychic condition of the child as well as the duration and invasiveness of the planned dental treatment, different methods of pain management are available: local anaesthesia, general anaesthesia and local anaesthesia in combination with sedation.

The latter option is especially suitable for anxious or unsettled children, in cases of an extensive, longer lasting treatment and in children with mild physical and cognitive disabilities and those with seizure disorder. Furthermore, sedation can be used in paediatric patients with cardiovascular, pulmonary or endocrine disorders when there is a necessity to prevent stress during treatment.

How to sedate

In dentistry, only minimal to moderate sedation is necessary, meaning that the patient is still conscious during the intervention, the patient airway is maintained and ventilator and cardiovascular functions are unaffected.

The desired sedative effect may be obtained by oral administration of midazolam or inhalation of nitrous oxide. While there is weak scientific evidence that these sedative agents are effective for children undergoing dental treatment, clinical experience shows that beneficial effects are obtained. For the use of other methods of sedation such as hypnosis, the scientific evidence is regarded as being insufficient.

Interaction between different agents

It is well-known that there is an interaction between the sedative drug and a local anaesthetic solution: Several factors can increase the potential of local anaesthetic toxicity. However, these effects are insignificant in cases of minimal to moderate sedation that is recommended for dental treatments.

In order to minimize the risk of side effects, it is particularly important to calculate the maximum recommended dose of the local anaesthetic for every single intervention. For children with low weight, local anaesthetics without epinephrine or with a reduced vasoconstrictor concentration (e.g. 3M™ ESPE™ Ubistesin™ 1:400,000) are recommended.

Conclusion

In paediatric dentistry, sedation may be used effectively to achieve anxiolysis and stress reduction, support the pain management performed by local anaesthesia and contribute to a successful treatment. In some cases, however, general anaesthesia may be required (e.g. with uncooperative children).

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Targeted reduction of the vasoconstrictor concentration

Monika Daubländer, Mainz, Germany

Especially when it comes to treating young risk patients, it is highly important for dental practitioners to understand the effects of local anaesthetics and vasoconstrictors on the cardiovascular system. This information can be used to select the appropriate method of pain control.

Local anaesthetics

Apart from the local anaesthetic agent, most local anaesthetic solutions contain epinephrine as a vasoconstrictor combined with sodium sulphite as an antioxidant. While the local anaesthetic agent functions as a brake that reduces the heart rate, cardiac output and blood pressure and has a vasodilatory effect, the vasoconstrictor functions as an accelerator. It increases the heart rate, cardiac output, ejection volume and blood pressure. Its concentration, the selected drug and the injection technique are the variables that determine the actual effect of the local anaesthetic on the patient.

Vasoconstrictor concentration

The vasoconstrictor has a positive impact e.g. on the intensity and duration of anaesthesia. However, it also increases the toxicity of the local anaesthetic in relevant concentrations in the blood. Especially at increased resorption and in cases of intravascular injection, cardiovascular side effects such as nausea, dizziness, tremor, but also hypertension, hypotension, bradycardia and tachycardia may occur. This is decisive since an unnoticed partial intravascular injection occurs quite frequently and may lead to an up to 80-fold increase of the epinephrine level.

The risk of side effects may be minimized by a reduction of the vasoconstrictor concentration: In a study in baboons, it was revealed that this measure leads to a lower increase of the systemic epinephrine level, while the desired effect of the vasoconstrictor is maintained[13]. The effectiveness of an epinephrine-reduced articaine solution (3M™ ESPE™ Ubistesin™ 1:400,000) in children and its potential to reduce side effects was also verified in a non-interventional study[16].

Risk assessment

Prior to the treatment of children considered at risk under local anaesthesia, an individual assessment is always required. Firstly, the dentist has to make every attempt to obtain accurate information on the patient’s pre-existing conditions. Clear contraindications for the use of a vasoconstrictor are phaeochromocytoma, hyperthyroidism, tachyarrhythmia and an allergic reaction to sulphite. Other contraindications such as hypertension, diabetes mellitus, bronchial asthma and pregnancy are relative – here, the concentration of the vasoconstrictor should be as low as possible. Secondly, the physical condition of the child should be checked – the metabolic equivalents of functional capacity may be useful for this purpose. It must always be taken into account that the risk of dental treatment is added to the risk of local anaesthesia. When the decision is made to treat a young risk patient under local anaesthesia, stress should be avoided in any case.

Differentiated approach

The higher the risk, the more important it is to opt for a local anaesthetic with a vasoconstrictor that is reduced to the required amount. With this approach, a high pharmacological safety is ensured.

References


Contact

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Risk assessment using the metabolic equivalents of functional capacity.

1 MET
Take care of yourself?
Eat, dress, or use the toilet?
Walk indoors around the house

4 METs
Can you …
Climb two flights of stairs or walk uphill? Run a short distance?
Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture?
Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

4 METs
Greater than 10 METs
Walk 100 m on level ground at 3 to 5 km per h?

Success rate of local anaesthesia in children using an articaine solution with epinephrine 1:400,000. The duration of treatment was approximately 15 minutes (± 10 minutes). Treatment was completed to the full extent in 99% of the cases[12].

espe.com
In paediatric dentistry, concepts for caries prevention are gaining importance. Almost every country in Europe seems to have its own recommendations and guidelines on how to effectively prevent the occurrence of tooth decay in the early stages of life. In order to learn more about the most decisive measures in caries prevention and maintenance of healthy oral conditions in children, we had a conversation with Prof. Jack Toumba BSc (Hons), MSc, PhD, FDS (Paeds), RCS (Eng). He is currently Professor of Paediatric Dentistry and Preventive Dentistry and Postgraduate Tutor in Paediatric Dentistry at the University of Leeds, UK. His particular expertise is in prevention of dental caries, dental trauma, slow-release fluoride devices and the clinical use of fluorides.

**Prof. Toumba, why is there a need for preventive measures especially in paediatric dentistry?**

Although the prevalence of caries in children started to decrease in industrialised countries many years ago, the phenomenon has not disappeared so far. In fact, it has become a polarised disease with a small group of children that is severely affected by dental caries. The risk for early childhood caries to occur is highest in kids with a low socio-economic status, which is linked to poor oral hygiene, frequent exposure to sugary snacks and drinks and limited exposure to fluorides. Since oral health can also affect the general health of a patient, it is particularly important to prevent tooth decay and detect early signs of caries to allow for non-operative dental treatment. In this way, a further progression of the disease is prevented, the lifespan of the tooth increased and the overall health of the patient improved. As a consequence, the child’s quality of life is usually enhanced.

Dental caries is a disease that results from complex and dynamic processes with many influence factors. For prevention and maintenance of good oral health in children, it is thus necessary to address these processes by combining different measures. First and foremost, it is important to identify children with a high caries risk and invite parental responsibility. They may need advice regarding oral hygiene at home, including information about how and when to brush the child’s teeth, dietary counselling and the instruction to reduce behaviours that promote the early transmission of mutans streptococci. A caries risk assessment should be carried out in the dental practice on a regular basis. In addition, the regular application of fluoride is an important measure, although not a magic bullet.

**Please describe how caries is effectively prevented in children.**

Fluoride affects the tooth in different ways. It has a positive impact on tooth formation: Enamel crystals become larger and more stable when...
fluoride is applied regularly. Secondly, the substance blocks the glycolytic enzyme enolase and thus inhibits bacterial acid production. When in solution, fluoride is also able to inhibit demineralisation, while remineralisation is enhanced by the formation of fluorapatite. Last but not least, the crown morphology is affected – the pits and fissures become shallower. It turned out that a decreased solubility of the enamel is obtained due to the activity of the fluoride ion in the oral fluid – a high fluoride content in the surface enamel is less important. From this finding, it can be concluded that a constant supply of low levels of intra-oral fluoride is most effective for caries prevention. This may be achieved by different measures.

What are the most effective methods of achieving the desired constant low-level fluoride supply in children?

In the dental office, the professional application of topical fluorides such as gels or varnishes should be carried out at least twice per year. Scientific evidence shows that fluoride varnish is very effective, for example. For a continuous fluoride release over time, specific glass devices may be useful in high-risk groups. They have been developed at the School of Dentistry in Leeds and release low levels of fluoride for up to two years. At home, fluoride toothpaste should be used for tooth brushing every day. The level of fluoride should be adjusted to the age of the patient and the assessed caries risk.

In general, fluoride tooth paste should be used in children from 6 months of age twice per day. In children between 6 months and under 2 years, a smear or a pea-size amount of toothpaste with 500 ppm of fluoride should be used, while the same amount of paste with 1,000 ppm of fluoride is recommended for children between 2 years and under 6 years of age. For children aged 6 years and older, 1 to 2 cm of toothpaste with 1,450 ppm of fluoride is appropriate according to the EAPD. There is scientific evidence showing that it may be advisable to use adult fluoride concentrations (up to 1,450 ppm) even in children under 6 years of age when a high caries risk has been identified. For children aged over 10 years the fluoride concentration can be up to 2,800 ppm and up to 5,000 ppm for children aged over 16 years.

However, in these cases, the caries risk must outweigh the risk of dental fluorosis that may be caused by swallowing a considerable amount of toothpaste. In order to reduce this risk, only a pea-size amount of paste should be used and parents should supervise tooth brushing at least until the age of 7 years. Additional measures such as the placement of resin-based fissure sealants may be required as well.

Please summarise the recommendations regarding the fluoride concentration in toothpaste used for children depending on age and levels of caries risk.

In summary, the most effective methods of achieving the desired constant low-level fluoride supply in children are:

- Professional application of topical fluorides such as gels or varnishes at least twice per year.
- Use of fluoride toothpaste at home, with adjusted amounts and concentrations based on age and caries risk.
- Consideration of glass devices for continuous fluoride release for high-risk groups.

References


Contact

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Caries prevention in paediatric patients

Prevention programmes adapted to the individual patient’s needs

Jacqueline Esch, Munich, Germany

There is an increasing awareness worldwide that individual caries prevention programmes for children are particularly important. As a consequence numerous countries have published their own guidelines with recommendations regarding effective preventive strategies. In Germany a new concept was developed that suggests starting with dental examinations at six months of age to ensure early identification of high caries risk. It is also used to teach parents adequate oral hygiene techniques for their kids and inform them about relevant aspects of a healthy diet.

Individual preventive programmes

The pertinence of individual preventive programmes for children is obvious: On one hand the primary teeth have a decisive impact on the development of the jaw. On the other hand the main goal of maintaining an individual’s natural dentition for a lifetime is reached only if the patient shows compliance, implements the required oral hygiene practices at home and visits the dentist on a regular basis. This is most likely when a child becomes familiar with the procedures very early.

The Bornholm method

In our international practice for paediatric dentistry in Munich, Germany, we have implemented the so-called Bornholm method, an effective caries prevention programme recommended by the Department of Preventive and Paediatric Dentistry at the University of Greifswald, Germany. It suggests that the first appointment is made when the child is eight months old to give parents advice regarding dental care at home, check the effectiveness of their techniques, examine the teeth and remove plaque in the dental practice. The diagnosis and an additional caries risk assessment using a scoring system are taken into account to determine the recall intervals for check-ups and professional tooth cleaning. During the subsequent visits which are continued until the age of 18, the prevention programme is adapted to the age-specific and individual skills and knowledge of the children. The goal is to teach them how to prevent caries progression with optimal oral hygiene and ensure that no fillings are required and an inflammation of the soft tissues does not occur.

The following case example shows how we proceed with a ten-year-old child.

Patient case

The female patient visits our dental practice twice per year for professional tooth cleaning and advice. At first she was asked to clean her teeth. For an assessment of the caries risk (which is not necessary at every appointment) 3M™ ESPE™ Clinpro™ Cario L-Pop™ was used (Fig. 1). This rapid test determines the lactic acid formation rate on the tongue and thus measures the metabolic activity of caries-causing bacteria. The swab was turned on the tongue four times and then brought into contact with the diagnostic liquid in the blister as recommended by the manufacturer (Fig. 2). Afterwards the test swab showed the colour of field 5 on the colour chart, indicating a moderate rate of lactic acid production (Fig. 3). This means that there are some weaknesses in the oral hygiene of the patient and there is a medium caries risk.

Subsequently, a plaque test was performed with coloured liquid (Fig. 4). After rinsing with water the remaining plaque was revealed (Fig. 5), showing that tooth brushing techniques needed to be improved. Specific advice was given. For professional tooth cleaning, 3M™ ESPE™ Clinpro™ Prophy Paste with a fine grit was used (Figs. 6 and 7). Figure 8 shows the result of the treatment.
In a final step, 3M™ ESPE™ Clinpro™ White Varnish may be applied for additional fluoride treatment (Figs. 9 to 12). This product leaves behind a virtually invisible film that adheres to the tooth surface and continuously releases fluoride.

Conclusion

Based on our experience with children of all ages we recommend the integration of individual caries prevention programmes into the dental practice. The treatment and advice given should be adapted to the specific needs of the patient by taking into account his age, social factors and his caries risk. By beginning early and creating a positive childhood experience, the compliance of the young generation is ensured and the basis for a lifelong preservation of the natural dentition are laid.

Contact

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Like in adults, minimally invasive treatment concepts are gaining importance in paediatric patients as well. The goal of this approach is that the lifespan of the tooth is increased by preserving as much of the healthy tooth structure as possible, and improving the longevity of a restoration by use of repairable high-performance restorative materials.

Being decisive for the primary and permanent dentition, minimally invasive restorative concepts are feasible mainly due to adhesive procedures. Despite the availability of diverse kinds of adhesives, there are clear recommendations on how to proceed in the permanent dentition: Scientific evidence has shown that the best results are obtained with the selective enamel etch technique.

**Bonding to primary teeth**

For the primary dentition, however, the situation is different: The structure and mineral content of primary teeth is unlike that of the permanent dentition. For example, primary dentin has larger tubules and less mineralized intertubular and peritubular dentin is available. As a consequence, the tooth structure is more permeable, so that a shorter etching time (7 seconds for primary dentin) leads to the desired result. Since it is very difficult to expose the tooth structure to phosphoric acid for such a short time, it is advisable to opt for self-etch adhesives in situations where the bonding surface mainly consists of primary dentin (usually in the posterior region).

The enamel also has a different structure. For effective bonding results, the first layer of prismless enamel is removed. Then, the etching time should amount to approximately 30 seconds. Thus, especially in the anterior area where large parts of primary enamel are available for bonding, selective enamel etching is the preferable technique.

**Restorative materials**

For effective restorative treatment in children, high-performance restorative materials are required. For adhesive dentistry, different kinds of resin-based materials are provided. According to various in-vitro studies, these materials offer different benefits — e.g. siloranes have a lower shrinkage and compomers offer a higher fluoride release than other resin-based materials. However, this does not make one material clinically more suitable than another. Rather, their clinical success is highly operator-dependent.

One of the most exciting new developments is that of bulk fill composites because they enable a simplified application technique. Layers of up to 4 mm thickness can still be cured effectively, leading to a quick and efficient restorative procedure.

An alternative option is offered with glass ionomer cements, which perform well in low-load situations such as Class I or small to medium Class II restorations. They allow for a quick procedure without separate bonding and are thus particularly suited for children with limited compliance.

**Résumé**

If used correctly, very good clinical results can be achieved with adhesive dentistry in many situations. One of the most important preconditions for treatment success is the knowledge about the specific structure of primary teeth. Another is the compliance of the patient, since a dry working field is necessary for adhesive procedures. In children with limited compliance, the use of alternative concepts (e.g. glass ionomer cements) may be a suitable option.

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Is there a need for another posterior restorative in dentistry? Clearly, the answer is yes. What is desired is a product that offers the mechanical properties users of products like 3M™ ESPE™ Filtek™ Supreme XTE Universal Restorative are familiar with, but allows for a more time-efficient placement procedure.

For this purpose, 3M ESPE developed the new 3M™ ESPE™ Filtek™ Bulk Fill Posterior Restorative. The material contains true nanotechnology and is available in five shades. It may be placed in increments of up to 5 mm, but if desired, a layering technique is also possible. In combination with the fact that the new material does not require a covering composite layer and is easily sculptable right after placement, this ensures a fast and easy filling procedure ideal for all kinds of posterior restorations.

Reducing shrinkage stress
Traditionally, a reduction in shrinkage and shrinkage stress has been accomplished by optimizing the filler composition as in Filtek Supreme XTE Universal Restorative. This restorative uses an innovative filler technology with silica and zirconia particles and clusters. The shrinkage inherent to any methacrylate matrix is low in this material and does not compromise its clinical performance when placed in layers of 2 mm.

In order to allow for increments of up to 5 mm in Filtek Bulk Fill Posterior Restorative, the nanofiller technology was adopted, but a different matrix developed. The composite contains a new aromatic dimethacrylate with high molecular weight (AUDMA) and a novel addition-fragmentation monomer (AFM).

Due to AUDMA, the polymer matrix developing during polymerization obtains a higher flexibility. AFM changes the polymerization reaction: Typically, light curing causes chains of monomers to form and cross-link with each other, resulting in a polymer network. Those monomers which are closest to the light source react immediately and the chains grow from this point. The increasing rigidity and decreasing volume of the network cause stress to develop at the margins. In contrast, AFM contains an additional reactive site that enables cleavage of the forming molecular chains during polymerization.

The obtained fragments are more evenly distributed so that the network relaxes and stress is prevented. Cross-linking again at a later stage, the final polymer structure is obtained.

Conclusion
The uniform network formation and the increased flexibility of the matrix result in a restoration that causes less shrinkage stress even when applied in 5 mm increments. As a consequence, a tight marginal seal is obtained and the risk of post-operative sensitivities is minimized, while superior physical properties are achieved.

This was confirmed in initial tests: Properties such as the wear resistance and polish retention are similar to those of the proven Filtek Supreme XTE restorative. An excellent handling and 24% faster application time was revealed in a field test with European dentists*. In this test, 150 Western European practitioners put the new product head-to-head against their preferred restorative materials that require different placement techniques. The materials included incrementally placed composites as well as high- and low-viscosity bulk fill materials. The result: 92% of the dentists would recommend the material to a colleague.

*3M ESPE internal data. Data available on request at 3M ESPE.
Preventive measures in children

Protection of permanent molars with fissure sealant

Jacqueline Esch, Munich, Germany

Especially in paediatric patients with a high caries risk the use of fissure sealants can be an effective method of caries prevention\(^1\). By sealing the enamel pits and fissures on the occlusal surfaces of permanent molars with a resin-based material, an impermeable barrier is created between the enamel and the oral environment. In this way the risk of caries development in the particularly vulnerable parts of molar teeth is reduced significantly.

Since the retention of the sealants is better on sound enamel than on questionably carious tooth surfaces\(^2\), we use to seal permanent molars of children who are likely to develop caries a short time after the complete eruption of the teeth. For the first molars the treatment is usually carried out at the age of six to seven. The procedure is explained by means of the following patient case.

Clinical case

The seven-year-old female patient presented in our practice for paediatric dentistry for one of the regular check-ups and prevention appointments after her permanent maxillary and mandibular first molars had erupted. Due to her high caries risk we decided to seal the fissures with 3M™ ESPE™ Clinpro™ Sealant.

Figure 1: Initial situation: Mandibular right first molar after the placement of rubber dam.

Figure 2: A rose-head bur is used for fissure preparation: The fissures are opened slightly and the surface is cleaned.

Figure 3: Alternatively 3M™ ESPE™ Clinpro™ Prophy Powder can be applied to the tooth surface with an air-polishing device to create a clean surface, followed by rinsing with water.

Figure 4: Application of 3M™ ESPE™ Scotchbond™ Universal Etchant to the enamel surfaces to be sealed. The etchant should be removed after 15 to 60 seconds. Here the exposure time was 20 seconds.

Figure 5: Situation after removal of the etchant with water and subsequent air-drying.

Figure 6: Dispensing of 3M™ ESPE™ Clinpro™ Sealant into the pits and fissures of the molar. The pink colour ensures clear visibility and precise control over the location and amount of sealant placed.

Figure 7: Result: After light-curing the sealant appears white. It provides a barrier that protects the vulnerable occlusal surface from plaque adhesion. For optimal results, the use of a fluoride-containing varnish is recommended.

Résumé

The described procedure is a quick and effective way of reducing the caries risk in paediatric patients. In order to provide for durable results, the quality of the sealant layer should be assessed on a regular basis and replaced if necessary\(^3\).

References


Contact

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Treatment of primary teeth with severe decay

Peter J. Gregory, Dalkeith, Australia

One might assume that long-term clinical success of restorations is only relevant in permanent teeth, since primary teeth are in situ for a short period of time. This assumption, however, is wrong: The time span between eruption and exfoliation of primary molars, for example, is about ten years. Thus, a primary tooth restoration should be reliable, durable and offer protection and support for the remaining tooth structure. This is decisive because primary teeth have a huge impact on how the jaw and the permanent dentition will develop.

Posterior teeth

Evidence-based dentistry indicates that in case of severe defects in the posterior region, the best results are obtained by placing nickel chromium crowns. These pre-formed crowns offered e.g. by 3M ESPE are indicated for the treatment of teeth with developmental defects such as amelogenesis imperfecta or dentinogenesis imperfecta. They are also used successfully as space maintainers and recommended for the restoration of pulpotomized molars where fillings are likely to fail, in traumatized teeth and those with demineralized enamel or carious lesions on multiple surfaces. The technique for placement of the crowns is simple, while factors such as restoration longevity and cost-effectiveness are regarded as being superior to other restorative materials. Due to their feature of full coverage, the crowns protect the affected teeth from future decay.

The Hall Technique

As an alternative to the conventional placement technique under local anaesthesia that involves caries excavation and tooth preparation, the Hall Technique developed by the Scottish dentist Dr. Norna Hall is worth mentioning. In this approach, caries removal and tooth preparation are not required and thus no local anaesthesia is necessary. Instead, a stainless-steel crown is just cemented on the affected molar. The idea behind this concept is that through crown placement, a sheltered, non-favourable environment is created for cariogenic bacteria, so that they will not flourish and the progression of caries is stopped. The technique is recommended for Class II lesions and may be suitable for Class I lesions if caries removal or a conventional restoration technique are impossible e.g. due to limited compliance.

Anterior teeth

For aesthetic reasons, stainless steel crowns are usually not placed in the anterior region. Instead, good clinical results are obtained with strip crown forms (e.g. 3M™ ESPE™ Strip Crown Forms). The transparent forms are filled with composite resin and placed on the prepared tooth with the aid of an adhesive to restore it to its original shape. In cases with minimum remaining tooth structure, a special rubber dam clamp (No. 212) offers a real advantage: It may be used to expose the remaining enamel surfaces completely and thus make them available for bonding. In this way, a long-term success of the composite restorations is ensured.

Summary

With the presented materials and techniques, it is possible to create reliable and durable full-coverage restorations for primary teeth. However, all options should be used in conjunction with individual preventive programmes only.

References


Contact

Dr. Peter J. Gregory BDSc (WA), MDsc (WA), FRACDS, FICD, Specialist Paediatric Dentist petergregory@highway1.com.au
Primary incisors with multi-surface caries are unsightly having poor aesthetics. In young children this is usually caused by feeding with a nursing bottle leading to early childhood caries. 3M™ ESPE™ Strip Crown Forms are available for the aesthetic restoration of carious primary incisors after the cause of dental caries is ascertained, dealt with and an appropriate comprehensive preventive regime instituted. The preventive treatment should include dietary advice, oral hygiene instruction and fluoride use before any restorative treatment is started. The strip crown technique is simple and straightforward providing excellent aesthetic results which greatly enhances patient and parent motivation to future dental and oral health provision.

Indications for strip crowns

The most common reason for provision of composite strip crowns is extensive or multi-surface caries in primary incisors. Other indications are: Congenital malformations of primary incisors (including amelogenesis imperfecta), congenitally discoloured primary incisors and discoloured primary incisors following trauma.

In the following, the technique for provision of strip crowns in primary incisors is explained step by step using a patient case.

Step by step technique

In this case, a child with multi-surface caries of the primary incisors needed full coverage restorations (Fig. 1). After application of topical (20% Benzo-caine) and local analgesia, the primary incisors should be isolated with dry dam. Like in the present case, cotton wool rolls can be used as an alternative. Subsequently, the mesio-distal widths of the incisors were measured to select the required sizes of celluloid strip crown forms to be used (Fig. 2) (sizes A1-A3 & B1-B3 are available). The shade of the composite resin was selected as well. Usually the lightest shade (i.e. A1) is most suitable for primary incisors. Today 3M™ ESPE™ Filtek™ Supreme XTE Universal Restorative is available in four light shades that match the colour of primary teeth: A1B, A2B, BW and XWB.

The selected celluloid crown form was trimmed using small curved scissors and vent holes were made in the incisal corners of the crown (Fig. 3). In the next step, all caries was removed with round burs in a slow-speed handpiece. Mesial and distal proximal slices were prepared and finally the trimmed crowns were trial fitted (Fig. 4).

If required 3M™ ESPE™ Vitremer™ Glass Ionomer Core Buildup/Restorative can be applied. In the present case the teeth were etched, followed by rinsing with water and air drying. Then, the bonding agent was applied and light cured. The crown forms were filled with composite resin in the selected shade and the composite was hollowed out to reduce excess. The filled crown forms were seated on the prepared teeth and excess composite was removed with a flat plastic and a probe (Fig. 5).

The composite crowns were light cured labially and palatally before the crowns forms were stripped off using a probe (3M™ ESPE™ Sof-Lex
Discs are suitable as well (Fig. 6). Afterwards, the crowns were smoothed and polished with discs (Fig. 7) and finishing burs and the surfaces were checked. Figures 8 and 9 show the result.

Both patient and parents were delighted by the vast improvement in the appearance of the teeth that motivation for oral dental health also improves drastically. Oral preventive advice should be reinforced on completion of strip crowns and at subsequent review visits during these enhanced receptive periods. The improved oral health can be supervised and monitored into adulthood.


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View the video showing an additional case at www.3MESPE.com/stripcrowns
Full coverage restoration of a primary molar

Patricia Gatón Hernández, Barcelona, Spain

Figure 1: Preoperative radiograph of the molar region of a 5-year-old child with a structural defect. It becomes evident that the dental crown is destroyed including large parts of the dentin, but the pulp is not affected.

Figure 2: Clinical situation prior to the restorative treatment. Due to the large dimension of the defect, it is decided to remove the affected tooth structure and place a 3M™ ESPE™ Stainless Steel Crown.

Figure 3: Tooth after caries excavation, preparation and indirect pulp capping. For protection, 3M™ ESPE™ Vitrebond™ Plus Light Cure Glass Ionomer Liner/Base was applied to the remaining thin layer of softened dentin that covered the pulp.

Figure 4: 3M™ ESPE™ Stainless Steel Crown that was the restorative of choice for the required treatment. These pre-fabricated crowns are available in six different sizes and pre-trimmed, belled and crimped to ensure a quick procedure.

Figure 5: Crown in place. Since the crown was slightly too long, it was trimmed using a 3M™ ESPE™ Crown Scissor and contoured. After try-in checking all contacts, the crown was cemented with 3M™ ESPE™ Ketac™ Cem Glass Ionomer Luting Cement.

Figure 6: Radiograph taken one year after crown placement. The pulp was still intact and secondary caries had not developed in the sheltered environment below the metal crown. Usually, caries progression is stopped and no further measures are necessary before the tooth is replaced by a permanent molar.

Figure 7: Buccal view of the teeth in occlusion. Due to the anatomical shape of the crown, it integrates perfectly with the adjacent and opposing dentition. The easy and quick procedure has led to the desired result and the integrity of the developing dentition was successfully maintained.

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View the video showing an additional case at www.3MESPE.com/steelcrown
In Austria, there are three public universities in Vienna, Innsbruck and Graz where a degree in dentistry can be obtained. In order to complete studies with the title of Dr. med. dent., three years of theoretical and three years of practical training are required. In some universities, several courses are attended together with students of medicine, while other dental schools have a completely separate curriculum. For a permission to practice dentistry in Austria, a dentist has to become a member of the Austrian Dental Chamber and must apply for registration via one of its regional organizations.

Post-graduate vocational training is not mandatory. There is currently one specialty – oral and maxillofacial surgery – which is officially recognized as a medical specialty and requires a degree in medicine plus four years of specialist training. In addition, diverse special interest training programmes are offered.

Healthcare system

There is a public compulsory health insurance in Austria which is provided by different organizations: Either regional medical insurance companies (Gebietskrankenkassen) or funds for specific occupational groups such as self-employed persons or teachers. The fees are paid in part by the members and partly (50%) by their employers. All public insurance providers cover basic dental treatment, while more complex types of treatment are usually not included. The amount of the subsidy may vary depending on the insurance organization. Fees are claimed by the dentist and the patient covers the remaining costs. Most patients pay for additional services not covered by their insurance organization privately and only a few of them have a supplementary private insurance.

Single practices still dominating

According to the Austrian Dental Chamber, 4,797 dentists have been practicing the profession in Austria in 2012. In 2010, the dentist to population ratio was 1:1,838 and the percentage of female dentists 36% (Council of European Chief Dental Officers 2012).

The most popular business model is that of a single practice, which I have chosen for myself as the most suitable form of business. Typical group practices with a true legal partnership and thus several owners are uncommon in Austria. More frequently, dentists enter into office-sharing arrangements which are designed to reduce facility expenses of each individual. Public clinics or health centers employing salaried dentists are only found in the larger cities, have a limited capacity and are thus accessible to a restricted number of patients so that most people select a private dentist. Officially, there are no dental hygienists in Austria and the number of chairside assistants is typically one to two per dentist. Currently, I have employed one assistant and an additional apprentice. All kinds of treatment are offered in my general dental practice apart from orthodontics and surgery.
## Calendar of Events 2014 / 2015

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