

儿童龋病学

Paediatric Cariology

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前 言

儿童龋齿的治疗工作对于每一位口腔医生都是一种挑战。对每个口腔诊疗小组来说，应努力通过优质口腔护理，帮助每一位儿童认识牙齿的重要性并避免医源性损伤，成长为拥有健康牙齿的年轻人。这主要是通过向儿童及其监护人提出预防性建议，使他们认识到牙齿健康的价值，知道如何维护牙齿健康。

在儿童口腔科保健中，预防龋齿始终是第1位的，这就需要口腔诊疗小组的全体成员经常深入到社区，开展促进口腔健康活动，尤其是氟化水源。

不幸的是，当乳牙，尤其是乳磨牙发生龋坏时，由于其形态特点可导致牙髓早期受累。因此，尽管早期诊断很困难，但对于简化治疗来说十分重要。幸运的是，乳牙牙髓治疗和预成冠方法相对简单易行，口腔医生都应具备这些技术。

我们希望这本书首先能够促进常规预防护理工作，其次能够向口腔医护人员（如口腔医生和技师等）提供现代的诊断方法和修复技术，以便更好地防治儿童龋齿。

现在仍有许多儿童不断受到龋齿的折磨，小小年纪就要面对各种各样的口腔治疗，而这些治疗手段很可能还包括一次或多次全身麻醉，这实在让人感到难过。虽然龋齿是一种可以预防的疾病，但遗憾的是很多儿童都有龋齿。

《儿童龋病学》一书，是迅速壮大的“口腔临床要点快速掌握系列”中一本非常优秀的新著。很多人还不能了解预防及治疗儿童龋齿的重要性，但如果工作做好了是非常有价值的。通常，要做好这项工作，医师必须在同一时间至少处理三个问题：患儿、龋齿，以及焦虑不安、心怀内疚或是漠不关心的家长，后者更加难以应付。这并非一项简单的工作。通过阅读这本简单易懂，并附大量图解的书，熟悉其中的最新观点和临床指导原则，你一定会大受裨益，工作也变得简单、轻松多了。

正如“口腔临床要点快速掌握系列”的一贯宗旨，本书重点阐述最新的、与临床密切相关的知识和观点。同样，这本书在儿童口腔护理方面也可能发挥很大作用。近年来，儿童口腔科发生了巨大的变化，而且随着新材料和新技术的不断应用，儿童口腔健康状况可望进一步改进。儿童龋病学是临床实践的一部分，临床医师需要不断更新相关的信息。本书就是为满足这种需求而编撰出版的。

主 编 Nairn Wilson

内容提要

“口腔临床要点快速掌握系列”是国际著名的Quintessence出版社近期出版的介绍口腔各科基本技术和最新医学理论的专业丛书。该丛书自2002年起陆续出版发行,我社第一时间引进,以便国内读者同步了解国际口腔技术发展的新情况。儿童龋病长期以来没有得到足够的重视,方法、技术的更新不及其他口腔学科。本书介绍了许多最新的儿童龋病治疗原则、修复方法及技术设备。本书采用中英对照编排方式,对提高读者的专业英语水平大有裨益,适合临床口腔科医师、技师和口腔医学生阅读。

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第 1 章 儿童龋病学：治疗和认识误区

Paediatric Cariology: Management and Myth

目 的

本章的目的是从儿童牙列发育和心智发育的角度来强调儿童龋病治疗的重要性。此外，也将讨论有关儿童龋病学的各种认识误区。

要 点

通过阅读本章，读者应认识到使儿童免受急、慢性牙痛之苦的重要性，特别是乳牙列对于维护全身健康及发育所发挥的重要作用。口腔诊疗小组成员应熟悉牙列的发育时间表，并且懂得如何利用这些知识来辅助判断儿童常见病对于牙体硬组织的影响。

引 言

龋齿是人类的一种常见病，涉及

Aim

This chapter aims to emphasise the importance of the management of caries in children in respect of their continued dental, emotional and educational development. In addition, various myths surrounding paediatric cariology will be discussed.

Outcome

Upon reading this chapter, the practitioner should have gained an understanding of the importance of ensuring that children remain free of both acute and chronic dental pain and appreciate the contribution of the primary dentition, in particular, to overall health and development. The dental team should also be familiar with the chronology of the development of the dentition and appreciate how knowledge of this assists in determining the effect of common childhood illnesses upon the dental hard tissues.

Introduction

Dental caries is one of the most preva-

到牙齿的硬组织,即牙釉质、牙本质和牙骨质,是口腔微生物作用于可发酵的糖类的结果。龋齿的特点是使牙体硬组织脱矿,进而引起牙齿的有机成分崩解,最终可导致细菌侵入,牙髓坏死,根尖周组织感染,并引起疼痛。然而在病变早期,由于可能发生再矿化,龋齿尚可以停止。近年来,西方世界的患龋率有所下降,可能的原因包括:氟化物的广泛应用(尤其是含氟牙膏),饮食习惯的改变,越来越多的使用抗生素,也可能由于微生物毒性的改变。

牙齿光滑面的患龋率下降最明显。尽管磨牙颊侧及腭侧的点隙也易患龋,但目前磨牙殆面窝沟点隙的龋齿易感性是最高的。然而患龋率的下降并不是均匀一致的。苏格兰健康委员会在1992/1993年度进行的口腔流行病学调查显示,12岁儿童患龋率达7%。

lent of human diseases. This disease involves the mineralised tissues of the teeth, namely enamel, dentine and cementum, caused by the action of microorganisms on fermentable carbohydrates. It is characterised by demineralisation of the mineral portion of these tissues followed by the disintegration of their organic material. The disease can result in bacterial invasion and death of the pulp and the spread of infection into the periapical tissues, causing pain. In its early stages, however, the disease can be arrested since it is possible for remineralisation to occur. Over recent years there has been a decline in the prevalence of caries in the Western World. Possible reasons for this include the widespread use of fluoride (especially in toothpaste), changes in the diet, the increased use of antibiotics, and possible changes in the virulence of microorganisms.

The decline in caries prevalence has been greatest on the smooth surfaces of teeth. The pit and fissured surfaces of the molar teeth now have the greatest disease susceptibility, although buccal and palatal pits and fissures remain caries prone. The decline in caries, however, has not been uniform but skewed. The Scottish Health Boards' Dental Epidemiological Programme survey carried out in 1992/93 showed caries in 7% of 12-year-old children.

不幸的是，很多口腔医师没有意识到保存乳牙列的重要性，这也更加误导了很多家长，认为乳牙可以不用治。我们希望通过本书，鼓励口腔医生、口腔治疗师以及口腔卫生士进一步完善自己的临床技能，更好的满足儿童的治疗需要，从而改变那些不重视乳牙列的观点（图 1-1）。

我们为什么要保存乳牙列？

人们越来越清楚地认识到牙齿健康与全身生长发育及健康是密切相关的。疼痛和感染会对健康造成不良影响。这些影响在儿童的急性疼痛中表现得尤为明显，然而慢性牙痛同样会出现问题。长期的慢性牙痛使儿童不能健康成长，所有龋坏牙都有可能会不时地引起疼痛及敏感，从而导致：

Unfortunately, many dental practitioners do not see the value in restoring the primary dentition. This reinforces the view of many parents that primary teeth are expendable. We hope that this book will encourage dentists, dental therapists and hygienists to develop their skills to meet the challenge of treating the young child and promote a change in attitude in those who do not value the primary dentition (Fig 1-1).

So Why Should We Restore the Primary Dentition?

It is becoming increasingly clear that dental health is intertwined with general health and development. Pain and infection have a detrimental effect on health. These are obvious in the child with acute pain, but chronic toothache also causes problems. A child with chronic dental pain cannot thrive and all carious teeth are likely to cause pain and sensitivity from time to time, resulting in:



图1-1 看牙应该是一个愉快的经历

Fig 1-1 A visit to the dentist should be a pleasant experience

- 失眠
- 情绪、行为的改变和注意力不集中
- 进食不适，食欲相应减退，使儿童错过正常生长发育的关键阶段：如身高、体重及头（大脑）围的最佳发育阶段

因此与无龋儿童相比，患龋儿童可能不能在生理、情感或者智力方面健康成长(图1-2至图1-4)。关爱儿童，他们的身体，特别是牙齿的健康至关重要。即使很简单的牙齿问题，也可能影响他们的全身健康或是学习，特别是对那些已经诊断患有全身疾病或有学习障碍的儿童。

口腔医生的工作目的是劝导患者及其家人不要随意放弃乳牙，因为维持乳牙列健康有助于：

- loss of sleep
- mood, behaviour changes and poor concentration
- uncomfortable eating, with subsequent loss of appetite and failure to meet developmental milestones: height, weight and head (brain) circumference.

Therefore, the child with dental caries may not thrive physically, emotionally or intellectually, compared to the caries-free child (Figs 1-2 to 1-4). Where children are concerned, their medical, and particularly dental, well-being is of paramount importance. Even relatively simple dental problems can impact upon the medical or educational needs of children, especially on those already diagnosed with medical disorders or learning disabilities.

The dental practitioner should aim to motivate the patient and their family by demonstrating that teeth are not disposable and restore primary dentition because it helps:



图1-2 上切牙龋坏，伴下牙槽脓肿的患儿
Fig 1-2 Young child with carious upper incisors and an abscess on tooth 61



图1-3 无龋儿童:a. 乳牙;b. 恒牙

Fig 1-3 Caries-free child with (a) primary teeth and (b) permanent teeth



图1-4 多颗牙齿拔除的儿童:a. 口内观;b. 口外观

Fig 1-4 Child who has had multiple teeth extracted (a) intra-oral view and (b) extra-oral view

- 保持牙列形态
- 保持牙齿美观
- 维持牙齿功能（咀嚼和说话）
- 保持恒牙间隙（图 1-5）
- 适应环境性
- 避免疼痛及脓毒血症——进而避免损伤恒牙

- restore form
- restore aesthetics
- restore function (mastication and speech)
- maintain space for the permanent teeth (Fig 1-5)
- acclimatisation
- avoid pain and sepsis — avoid damage to the permanent teeth



图1-5 乳牙就像一个天然间隙保持器 ,为恒牙的萌出保持间隙

Fig 1-5 Primary teeth act as a natural space maintainer for the permanent teeth

- 避免拔牙，尤其是全麻下拔牙
- 对免疫力低下的患儿 ,避免脓毒血症以及手术治疗的风险

牙列发育时间表

乳牙列和恒牙列的生长发育受以下因素的影响：

- 遗传因素
- 营养因素
- 全身的生长发育情况

据报道，乳牙列萌出时间在种族间很少有差异。但是，恒牙列萌出时间有种族差异，例如，亚洲儿童牙齿发育完成要早于同龄的高加索白种人。所以当医师检查一个儿童牙齿的萌出时间是否在正常范畴内时一定要注意（表 1-1）。

对秘鲁营养不良的儿童调查表明，他们在婴儿期乳牙萌出时间延后。这

- avoid extraction, particularly under general anaesthesia
- avoid sepsis and surgical intervention in the medically compromised child.

The Chronology of the Development of the Dentition

The development of the primary and permanent dentitions is affected by:

- genetic factors
- nutrition
- somatic growth and development.

There is little variation reported between different races in the timing of eruption of the primary dentition. Racial variation, however, can be seen in the eruption of the permanent dentition—for example, Asian children complete their dental development faster than their Caucasian peers. Therefore, care must be applied when dentists seek to compare an individual child to the normal eruption times (Table 1-1).

Studies in Peru, on malnourished children, have shown that infants were delayed

表1-1 乳牙及恒牙的萌出时间

Table 1-1 Eruption dates of primary teeth and secondary teeth

乳 牙	萌出时间 (月)
乳中切牙	6
乳侧切牙	9
乳尖牙	18
第一乳磨牙	12
第二乳磨牙	24

注：钙化开始：妊娠4~6个月；根尖发育完成：萌出后12~18个月

恒 牙	萌出时间 (年)	钙化开始时间 (年)
中切牙	7	0.3
侧切牙	8	0.3/1 [#]
尖牙	9/12 [#]	0.3
第一前磨牙	10	2
第二前磨牙	11	2
第一磨牙	6	出生
第二磨牙	12	3
第三磨牙	16~24	8~14

注：# 下颌 / 上颌；萌出后2~3年根尖发育完成

种营养与牙齿发育、全身发育的联系也可见于早产或低出生体重儿。只有在解决营养和疾病问题后，孩子的牙齿发育才能‘赶上’正常的水平，全身生长发育才能在身高、体重以及头围等方面‘赶上’正常标准。

in the eruption of their primary teeth. This link between nutrition, dental development and general growth can also be seen in premature and low birthweight babies. These babies will catch up on their dental development once their nutrition and medical problem has been rectified and somatic growth will catch up with the normal milestones for length, weight and head

营养学家经常研究错过正常发育阶段的儿童，这些儿童可能需要补充营养食品：这些食品通常富含糖类，所以对这些儿童来说保持口腔卫生和应用氟化物是至关重要的。对其他儿童来说可以通过适当地限制饮食，提供口腔护理以达到预防牙痛的目的。

口腔诊疗小组在婴幼儿生长发育过程中起关键作用。

儿童发热性疾病和龋齿易患性

儿童常见病可以影响同时期发育的牙体硬组织的形成，可能导致牙体硬组织矿化不全和色泽改变。一旦明确诊断，口腔诊疗小组应该警惕该儿童可能是龋齿高度易患者，因而需要针对该个体采取强化预防控制手段。

受儿童发热性疾病影响的牙齿更易患龋，因为：

- 牙齿形态的改变
 - 釉质多孔性
 - 由于敏感，难于维持良好口腔卫生状态
- 例如磨牙切牙矿化不全（MIH），

circumference.

A nutritionist often investigates children who fail to meet their normal developmental milestones. Such children may be placed on dietary supplements: these are generally carbohydrate-rich and so oral hygiene and fluoride therapy are of paramount importance. Other children are referred for dental care to manage dental pain, which may be deterring adequate food intake.

The dental team plays a key role in infant growth and development.

Childhood Fever and Caries Susceptibility

Common childhood illnesses can affect the coincidental dental hard-tissue formation. This can result in hypomineralisation and discolouration. As soon as this is diagnosed, the dental team should be alerted to the fact that the child will have a high caries risk and consequently needs personalised, enhanced preventive management.

Teeth affected by childhood fevers have increased susceptibility to dental caries due to:

- altered tooth morphology
- enamel porosity
- difficulties in maintaining good oral hygiene due to sensitivity.

An example of this is molar incisor

即：恒切牙和第一恒磨牙受累(可能也有尖牙的牙尖),受累牙齿表现为萌出后釉质丧失。

举例说明可引起釉质缺陷的儿童常见病有：

- 水痘
- 麻疹
- 中耳炎
- 呼吸或泌尿系统感染引起的发热
- 可引起皮疹的其他发热疾患(记住釉质和皮肤同是来源于外胚层)

认识误区

缺 钙

- 机体对钙离子水平的调节非常精细,因此在发达国家很少出现缺钙现象。
- 缺钙并不会导致牙齿中钙质向外“泄漏”。
- 釉质一旦形成,造成钙质流失的惟一的原因是环境因素,如龋、酸蚀或磨损。

母乳喂养和牙齿?

- 高度推荐母乳喂养。
- 对婴儿来说母乳优于牛乳。

hypomineralisation (MIH), in which the permanent incisors and first permanent molars are affected (and possibly also the tips of the canines). The affected teeth appear to be prone to post-eruptive enamel loss.

Examples of the common childhood illnesses that can cause enamel defects are:

- chickenpox
- measles
- middle ear infections
- fevers caused by respiratory or urinary tract infections
- other fevers that cause skin rashes (remember that enamel and skin share a common ectodermal origin).

Myths

Calcium Deficiency

- The body regulates calcium levels so rigorously that deficiency in the developed world is rare.
- Calcium deficiency does not lead to calcium “leaking” back out of the teeth.
- Once enamel is formed, the only reason calcium is lost is due to an environmental cause such as caries or acid erosion or attrition.

Breastfeeding and Teeth?

- Breastfeeding IS highly recommended.
- Human milk IS better than cows’ milk

- 母乳喂养有助于孩子的发育 ,特别是大脑的发育。
- 如果在正常的时间内断奶 ,则对牙齿无害。
- 但有求必应的母乳喂养 ,尤其是夜间和超过断奶期的母乳喂养 ,可以导致龋齿。

“ 软 ” 牙会在家族内传播吗 ?

遗传缺陷

先天釉质缺陷的儿童 ,如釉质发育不全 ,或其他牙体硬组织疾病(如牙本质发育不全) ,可能会对龋齿更加易患 ,但这种情况很少见。

- 如果怀疑是先天性牙体硬组织缺陷 ,必须询问家族史(家系)。
- 显微镜下检查脱落或拔出的牙齿。
- 应首先排除环境因素(如儿童常见病的影响)。

“ 家族 ” 龋

- 一个家族倾向于一代一代地将其饮食习惯传递下去。由此 ,祖母(奶奶)的牙齿早失可能暗示 “ 甜食牙 ” 是其家族现象。

for human babies.

- Breastfeeding assists growth and is especially beneficial to brain development.
- Provided children are weaned at the normal time there is NO damage to teeth.
- BUT breastfeeding on demand, especially during the night, beyond weaning, DOES cause caries.

Do “Soft” Teeth Run in the Family?

Inherited defects

Children with congenital enamel defects such as amelogenesis imperfecta or disease of the other dental hard tissues (e.g. dentinogenesis imperfecta) may be more susceptible to caries, but these conditions are rare.

- A family history (pedigree) should be ascertained if a congenital defect of the dental hard tissues is suspected.
- Exfoliated or extracted teeth can be examined microscopically.
- Environmental causes (i.e., the effect of a common childhood illness) should be ruled out first.

“Family” caries

- Families DO tend to pass on their dietary habits through generations. Therefore, granny losing her teeth early could be an indication of a “sweet tooth” being a family phenomenon.

- 龋齿的主要病原体——变形链球菌是可传染的，确切的证据证实，细菌可以从母亲传递给婴儿。
- 母亲患龋率高，孩子也很有可能患龋。

药 物

- 药物尤其是药品的配剂，可以致龋，但是只有在含糖的时候才致龋。
- 一些药物是无蔗糖的，但是可能含有其他糖的成分，如葡萄糖浆。
- “无糖制剂”意味着完全无糖。
- 许多儿科药物包括抗生素已经有了无糖制剂。口腔医生及其诊疗组应该建议家长和医药人员在处方上添加字母SF，表示无糖制剂——这对需要反复用药的孩子尤为重要。
- 抗生素不会导致牙齿变色或者矿化不全进而增强龋齿易患性；需要服用抗生素的疾病才是罪魁祸首。尽管如此，今后我们仍要鼓励开具无糖抗生素。
- 医师们只在特殊情况下（如纤维
- Streptococcus mutans, the main pathogen responsible for caries, IS transmissible and there is very good evidence to show that it is passed from mother to baby.
- Children of mothers with a high caries rate are more likely to develop caries themselves.

Medicine

- Medicines, in particular, elixirs, CAN cause caries BUT only if they contain sugar.
- Some medicines are sucrose-free, but may contain other sugars such as glucose syrup.
- “Sugar-free” means no sugar at all.
- Many paediatric medicines including antibiotics ARE now available in “sugar-free” preparations. Dentists and their teams should advise parents and medical and pharmacy colleagues to add the letters ‘SF’ for sugars-free to written prescriptions — this is particularly important in cases in which repeat prescriptions are required.
- Antibiotics DO NOT cause discolouration or hypomineralisation leading to increased caries susceptibility; it was the illness for which antibiotics were prescribed that was the culprit. However, ensure sugars-free antibiotics are prescribed in future.
- Doctors rarely prescribe tetracyclines