

Some facts about tooth-brushing and dental care

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There is plenty of advice available on how long, how often, and with what toothpaste the teeth should be brushed. However, the part played by toothbrushing in promoting oral hygiene, and the best way of using a toothbrush to make this part most effective, is less evident. This article on 'the art of toothbrushing' is unusually prescriptive by the standards of *Education and Health*, but the author suggests that such prescription is appropriate if the general level of oral hygiene is to be raised.

Toothbrushing is a simple and efficient way of keeping the teeth clean, and although effective anti-bacterial mouth-rinses are becoming available, the toothbrush is likely to be around for a long time yet. Studies have shown that people who brush their teeth twice a day or more have cleaner mouths than those who brush only once a day or less. Results of analyses of the Version 10 Health Related Behaviour Questionnaire and of a recent Government survey of the dental health of children (1) have shown that, amongst 14-15 year olds, over one-third clean their teeth once a day or less frequently. The same is true of adults who have their own teeth, so it can be presumed that the brushing patterns adopted at school-age are continued into adult life. However, people are becoming more dentally conscious, and are brushing their teeth more often than they have in the past. Twenty years ago almost half the adult population with natural teeth brushed them only once a day.

What effect does good toothbrushing have on dental health? Toothbrushing removes harmful bacterial plaque, which

forms at the neck of the tooth in a matter of hours. These bacteria cause inflammation of the gum (gingivitis); in some cases this progresses to periodontitis, which is characterised by pockets forming between the gum and the teeth and resorption of the jawbone which supports the tooth in its socket. Minor inflammation of the gums is very common, although only in a comparatively small number of cases does this lead to severe periodontitis. These periodontal diseases can largely be prevented by oral hygiene measures. We know that people who brush their teeth frequently have less periodontal disease than those who brush less frequently or only occasionally.

Dental caries, on the other hand, is principally caused by harmful patterns of sugar consumption. Even the best toothbrushing can reduce caries only slightly (2). The value of toothbrushing in this case is the regular application of fluoride toothpaste, as fluoride prevents caries. But still *the most important prevention measure against dental caries is reduction in the frequency of sugar intake.*

Toothbrushing methods

Many ways of brushing the teeth have been described and advocated over the years. The most important factor in assessing any toothbrushing method is that plaque should be removed as thoroughly as possible without damaging either the teeth or the gums. The method should be simple to perform and not require great feats of manual dexterity.

The methods which have been described include the *physiological*, which is an attempt to reproduce the action of eating and the friction produced when food is chewed (Fig. 1). The bristles are placed on the teeth and rotated towards and across the gum. This method is all very well in theory, but is only effective if the teeth are perfectly aligned, which is rare. Moreover, unless the gums are perfectly healthy (and minor gum inflammation is almost universal), any existing gum condition is likely to be made worse. Until recently, the *roll method* (Fig. 2) was the most frequently recommended. This method requires considerable manual dexterity to rotate the bristles from the gums towards and across the teeth. This is especially difficult on the inside surfaces, and young children do not have the dexterity to perform it. Recent studies have shown the roll method to be no better, if not inferior, to other methods of toothbrushing, and it is no longer the preferred method. More recent studies have shown the *short horizontal scrub method* of brushing (Fig. 3) to be particularly effective in children. Here, the brush is moved in short vibratory or circular strokes back and forth horizontally along the line of the brush for not more than half its length.

Based on what is known today, a *modified scrub method* is generally considered the most satisfactory (Fig. 4). This consists of very short backwards and forwards vibratory or small circular strokes (not more than half the length of the brush) followed by a short twist to the bristles (adapted from the roll method) to sweep the plaque away from the embrasures between the teeth. The

biting surfaces of the back teeth are brushed with a short scrubbing stroke.

Children's toothbrushing techniques

While dentists have been carefully devising these and other methods of toothbrushing (space does not permit descriptions of each and every one, but they are no more than modifications of the above), little attention has been paid to what brushing actions people actually use when they clean their teeth – that is, the way people brush by natural inclination. It would seem only sensible to base a method which is to be generally advocated on the way people would naturally use a toothbrush. For this reason, we undertook a study to analyse the way secondary schoolchildren, who had not received any previous toothbrushing instruction, brushed their teeth (3).

These studies were conducted at schools in Newcastle-upon-Tyne. We constructed a partition with a 'see-through' mirror to cover a door frame, with a tumbler of water and rinsing bowl on one side, and a video camera on the other side. The children brushed their teeth at the rinsing bowl, looking in the mirror, and were filmed, while brushing, through the mirror from the room on the other side of the partition. The children had no knowledge that they were being filmed, or that the partition covered a doorway.

We then viewed the tapes repeatedly to analyse the way the children brushed their teeth. The results showed that a horizontal scrub stroke was the most popular; that more time was spent brushing lower teeth than upper teeth and front teeth than back teeth (where plaque accumulates most); and that only 4% of the total time spent brushing (average for 11-14 year olds being 52 seconds, excluding pauses for rinsing) was spent brushing inside surfaces. Half the children did not brush any inside surface at all. A subsequent study of young adults, using the same technique of filming through the mirror, showed they took less time to brush their teeth (average 33 seconds) than the children, but spent a greater proportion of their brushing time, though still small (12%),

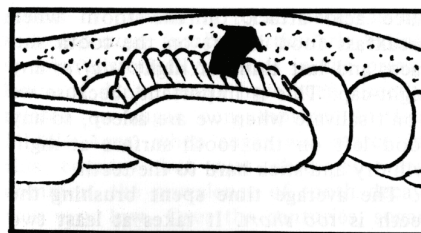


Fig. 1. *Physiological method* The brush is rotated from teeth to gum. The method attempts to reproduce the frictional action of chewing food. While theoretically sound, the teeth must be perfectly aligned and the gums perfectly healthy, otherwise it is ineffective and likely to worsen any existing gum condition. It cannot therefore be generally recommended.

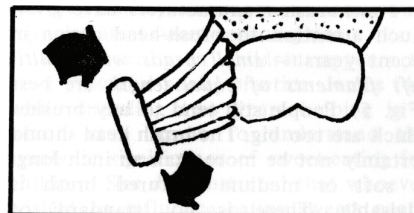


Fig. 2. *Roll or vertical method* The brush is laid alongside the teeth with the bristles against the gum. The handle is rotated so that the bristles sweep over the gum and teeth. However, young children do not have the manual dexterity to brush their teeth this way, and it is only moderately effective in practised hands.

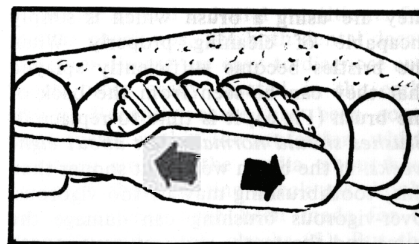


Fig. 3. *Short horizontal scrub (Bass) method* The bristles are held at 45° to the long axis of the tooth in an attempt to clean the crevice at the gum margin. The bristles are gently vibrated with horizontal or small circular movements over a short distance. Quite effective if the brush head is small.

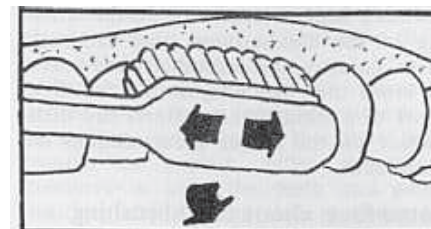


Fig. 4. *Modified scrub method* This is a combination of the roll and vibratory methods, where the brush is given a slight twist to sweep plaque from the embrasures between the teeth after the short vibratory horizontal or circular movements. A short scrubbing stroke is used on the biting surfaces. This method is widely advocated.

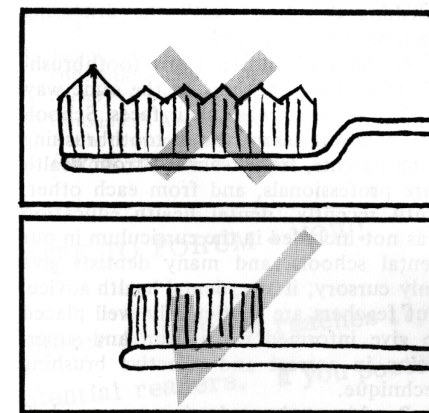


Fig. 5. The head of the brush should be small and the filaments should be multi-tufted and uniform in length. The handle should be straight and in line with the head. There is no difference in brushing efficiency between natural and synthetic bristles. However, natural bristles, which are hollow, should be allowed to dry out properly after use.

brushing inside surfaces. A further finding in the children was that although these uninstructed individuals were seen to brush their teeth vigorously for little short of a minute, their efforts had little impact on the plaque accumulations on their teeth.

Some facts about toothbrushing

Proper toothbrushing needs instruction. This is the message of these and other toothbrushing studies reported in the literature. People need to be shown, indeed *trained*, to brush their teeth. The important thing is not that toothbrushing should be 'correct' but that the brushing activity should remove the plaque. The mouth needs to be inspected for plaque deposits, using a disclosing agent, and brushing continued until the disclosing stain has been removed.

Pre-school children learn toothbrushing from their mothers in the same way as they learn to wash their faces. School-age children learn about toothbrushing from parents, from teachers, from health care professionals, and from each other. Until recently, dental health education was not included in the curriculum in our dental schools, and many dentists give only cursory, if any, dental health advice. But teachers are particularly well placed to give informed instruction and supervision in correct and effective brushing technique.

Brushing *twice a day* is recommended, the first time *before* breakfast, because there should then be no plaque to pro-

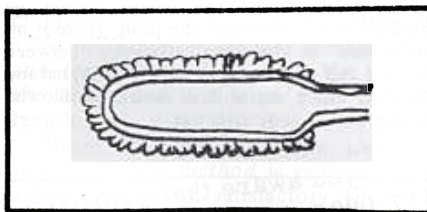


Fig. 6. As toothbrushes wear they become progressively less efficient. Brushes should be replaced as soon as the bristles become bent or broken. A useful test is to view the bristles from the back of the brush. When you can see them, as in the diagram, it is time to replace it. This will be about every two months.

duce acid attack on the tooth when breakfast food is left on the tooth surface; and last thing at night – *after* any night-cap. This is important, because we don't salivate when we are asleep, so any food left on the tooth surface at night will dry and stick hard to the teeth.

The average time spent brushing the teeth is *too short*. It takes at least two minutes to clean the teeth properly. Brushing should be systematic, starting on outer surfaces of the upper left side and working around to the right, then cleaning the upper inside surfaces in the same sequence. Then the same for the lower teeth. Disclosing agents are a good test to see whether the plaque has been removed, and are essential in any toothbrushing training programme.

Toothbrush manufacturers have given much attention to brush-head design in recent years – *small heads with multi-tuft filaments of equal length* are best (Fig. 5). People still tend to buy brushes which are too big. The brush head should certainly not be more than an inch long. A soft or medium textured brush is advisable. There is no 'standard' of texture of toothbrushes, but hard brushes should be avoided as they can cause the gum to recede.

It is important to replace the brush when it shows signs of wear. Studies have shown that as a toothbrush wears its ability to remove plaque decreases. People tend to hang on to brushes for too long, so that for much of the time they are using a brush which is simply incapable of cleaning properly. When the bristles become sufficiently splayed that they can be seen from the back of the brush (Fig. 6), it is time to replace it. *Brushes should normally last about eight weeks*. If the brush wears out sooner than this, toothbrushing may be too vigorous. Over-vigorous brushing can damage the gums and the teeth, and may cause tooth sensitivity.

Tooth decay and sweets

Toothbrushing is only part of the answer to preventing dental disease, and, as mentioned above, is mainly directed at preventing gum disease. The most important

means of preventing tooth decay is by *reducing sugar intake*, particularly eating sweets. Historically, trends in the prevalence of dental decay have been directly related to sugar consumption. In the Middle Ages, when sugar was scarce in this country but gum abscesses were common, the prevalence of tooth decay was very low. Over the centuries, sugar consumption and the decay rate associated with it gradually increased. In 1845, the excise duty on sugar imports was lifted. From that time onwards sugar consumption increased dramatically and the decay rate soared. Today, sugary foods (particularly sweets) remain the prime hazard as far as our teeth are concerned. Teachers therefore have an important role to play, not only in giving children dietary advice, but in endeavouring to control sweet consumption.

Sweet eating in children appears to be a powerful social practice. James (4), while spending two years helping in a youth club, came to understand the symbolic significance of sweet-eating for children. She demonstrated that whoever wished to influence eating sweets needs to understand the meanings children attach to them; for it is these systems of meaning which make the consumption of 'kets' (rubbishy sweets) so persuasive.

Preventive dentistry

The habit of attending a dentist regularly is also worth emphasising as a means of preventing dental disease. Only a minority of people attend a dental practitioner for regular check-ups, yet both dental decay and gum disease are easy to diagnose and much more easily treated in the early stages. Recently there has been some controversy within the profession, which has been aired in the media, about how frequent these routine check-ups should be. Arguments have been made for 6-monthly and yearly checks (5). But the debate is really unnecessary; the decision is best made for each individual by their own dental practitioner. The recommended interval between inspections should be decided on clinical grounds – that is, the rates of decay and progression of any gum disease, as well as the individual's

age and other relevant factors. Patients should make a point of discussing their case with their dentist.

People would do well to choose a dentist who has a positive interest in prevention, who takes the time and trouble to explain active preventive measures to keep the teeth and gums healthy, and expects their patients to comply with them.

References

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