

IN BRIEF

- An introduction to Medieval documents relating to dental problems is given.
- Medieval herbal remedies for dental problems are outlined.
- The earliest evidence for filling material is provided.
- The earliest evidence for the manufacture of false teeth is presented.

Dental treatment in Medieval England

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Medieval (12th–14th century) medical literature suggests that care of the teeth was largely limited to non-invasive treatment. Cures, mainly for toothache and 'tooth worm' were based on herbal remedies, charms and amulets. Bloodletting was advised for certain types of toothache. There is also documentary evidence for powders to clean teeth and attempts at filling carious cavities. Surgical intervention for oral cancer and facial fracture is also known. Post-operative infection and abscess formation can be identified and early forms of false teeth are mentioned.

INTRODUCTION

Medieval texts dated from the twelfth to the fourteenth centuries suggest that dental treatment was largely based on herbal remedies, amulets and charms. Toothache appears to have been a major problem. However, there are references to surgical intervention for oral cancer, as well as the treatment of fractures and dislocations and mandibular fistula. Surgeons were familiar with the use of the tent to keep wounds open. Hagiographic literature indicates that in some cases the only hope of a cure was prayer or pilgrimage (Appendix A).

THE MEDICAL LITERATURE

Chirurgia

The *Chirurgia* of Roger Frugard was written in Latin c.1180AD at Parma, northern Italy.¹ A thirteenth century Anglo-Norman translation in French (British Library: Sloane

1977, 3525) as well as a Middle English text (British Library: Sloane 240) are known.¹ Thus, it is one of the earliest surgical texts available to academic English doctors. At least 20 MSS are extant, including those at Florence (Biblioteca Nazionale: Cod. Magliabecchianus J.10.16) and Paris (Bibliothèque Nationale: 7035). However, perhaps because he does not quote Byzantine or Arabic authorities, his work was rarely referred to by other Medieval authors.¹ The present text is based on the MS housed at Cambridge (Trinity College 0.1.20). An MS that contains illuminated initials as well as line drawings and has been copied by various hands.¹

Roger was aware that, 'if the flesh is hard, perforated and blackened' ('Si la char est dure, perse e anerie') cancer ('cancre') of the mouth was difficult to cure.¹ Apparently, this refers to long-standing disease with necrosis and suppuration. However, in the acute stage, the disease can be cured by cutting into the normal flesh around the hard cancer and then cauterising the wound and sealing it with egg yolk ('muel de oef').¹ Then the gums should be washed in wine and after three days, rubbed with alum. Then apply a lotion made from wine and honey infused with roots of mullein (*Verbascum thapsus*); honeysuckle (*Lonicera*

periclymenum); pomegranate (*Punica granata*); pellitory (*Anacyclus pyrethum*) and ginger (*Zingiber officinalis*).¹

Dislocation of the jaw can be identified when the upper and lower teeth cannot be placed in normal apposition.¹ Reduction could be obtained by manipulation, while holding the mandibular condyles. Afterwards one should apply a preparation of marshmallow (*Althaea officinalis*) and green ointment.¹ The patient should then be given soft, easily digested food so that excessive chewing does not lead to recurrent dislocation.¹

In the case of an open fracture, one in which both bone and flesh are broken ('la depezure avient de l'os e de la char') the wound is kept open by inserting a tent.¹ A small pad was also placed on the lowest part of the mandible. While the fracture is repairing, the patient should eat soft meat and two or three times a day one should anoint the wound with powder and other things ('puldre et autres choses does foiz u trois le jor').¹

Roger was aware that small fistulae affect the mandible. His cure was to insert a tent to soak up the suppuration, 'jus mali terre'.¹ The majority may have been secondary to infection of broken down tooth crowns. Although, incompletely healed

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Refereed Paper

Received 24.06.03; Accepted 23.10.03

doi: 10.1038/sj.bdj.4811726

© British Dental Journal 2004; 197: 419–425

wounds could also lead to fistula.

He provides one recipe against pain in the teeth and the gums:

Firstly, one must cauterise the fontanelle which is behind the skin behind the ear ('...une quichun en la funteinele derer en la char qui est dereire l'oraille').¹ Then you heat henbane (*Hyoscyamus niger*) and leek (*Allium porrum*) seeds over hot coals and ensure that the patient inhales the smoke through a funnel. Apparently, this is a cure that provides wonderful pain relief.¹

The Physicians of Myddfai

This is a collection of Welsh herbal and folklore remedies, which were written down in the early part of the thirteenth century.² The present translation was published in 1861, based on a MS then housed in Llanover library.² Different foods are recommended for each month and efficacious times for bleeding are outlined.² It appears that toothache was a major problem and could be treated with herbal remedies. Plants used to combat oral pain included: ivy (*Hedera helix*) bark; honeysuckle (*Lonicera periclymenum*) leaves; betony (*Stachys betonica*); round birthwort (*Aristolochia sp.*); thorn apple (*Datura stramonium*); holly (*Ilex aquifolium*) leaves; bruised roots of pellitory of Spain (*Anacyclus pyrethrum*).² The latter, shaped into balls, had to be retained between the cheek and the painful tooth:

*'...as long as you walk a mile with moderate steps, and as the saliva collects spit it away. When you think that the ball has been there as long as that, put in another and walk backwards and forwards for the same space of time; after that put in the third, then lie in bed, and warm yourself well, and when you have slept you will be free from pain. This I have proved and have found to be a present remedy for toothache'*²

Another recipe included distilled water of red roses, a small portion of beeswax, and a little fresh butter, mixed together in a dish upon embers, which is applied with a linen cloth to the affected jaw as hot as it can be borne.²

One remedy was based on a mixture of magic and prayer:

'Get an iron nail and engrave the following words thereon, + agla + Sabaoth + athanatos + and insert the nail under the affected tooth. Then drive it into an oak tree, and whilst it remains there the toothache will not return. But you should carve on the tree with the nail the name of the man affected with toothache, repeating the following: By the power of the Father

*and these consecrated words, as thou enterest into this wood, so let the pain and disease depart from the tooth of the sufferer. Even so be it. Amen'*²

or more simply, toothache could be prevented by:

*'whenever you wash, rub the inside of your ears with your fingers'*²

Several remedies considered that a worm was the cause of oral pain. In one case the patient was said to have swallowed the worm.² The tooth worm was mentioned in the Anglo-Saxon collection of folk medicine, the *Lacnunga*.³ Welsh 'cures' against the tooth worm include:

*'Take a candle of sheep' suet, some eringo (sea holly Eryngium maritimum) seed being mixed therewith, and burn it as near the tooth as possible, some cold water being held under the candle. The worms (destroying the tooth) will drop into the water, in order to escape from the heat of the candle'*²

Two early forms of dentifrice are mentioned:

*'Take elecampane (Inula helenium), and scrub your teeth therewith briskly, it will make them firm, white and healthy'*²

*'Take the leaves of sage (Salvia officinalis), powder with as much again of salt, and make it into balls. Bake them till they are burnt and powder. Let your teeth be rubbed frequently therewith. It will render the teeth clean, white, and sweet'*²

No specific oral diseases are mentioned. Two gargles for soreness and gangrene of the mouth are described:

*'Take rosemary (Rosmarinus officinalis) tops, sage (Salvia officinalis), honeysuckle (Lonicera periclymenum), and mallows (Malva sylvestris), of each a handful, and boil together well in as much spring water as will cover them, until it is reduced to a third, then take some pure honey boiled in spring water with as much as a pigeon's egg of alum, and boil in the filtered decoction of herbs till reduced to a third, then keep in a glass bottle well corked, and wash your mouth therewith'*²

*'Take a cupful of wine or claret, and a sprig of rosemary (Rosmarinus officinalis), boiling them together; put in a piece as big as a nut of frankincense, a spoonful of honey, and two of water, mixing them well together. Wash the mouth frequently, and it will be cured'*²

Two recipes refer to cancer of the mouth:

*'Take eight or nine leaves of sage (Salvia officinalis), and pound well with some salt and vinegar, apply a plaster to the part'*²

*'Take the juice of plantain (Plantago sp.), vinegar, and the distilled water of red roses, mix with water and wash the mouth therewith frequently'*²

There are several bizarre recipes for powders that are thought to promote painless extraction:

*'Take some newts, by some called lizards, and those nasty beetles which are found in fens during summer time, calcine them in an iron pot and make a powder thereof. Wet the forefinger of the right hand, insert it in the powder, and apply it to the tooth frequently, refraining from spitting it off, when the tooth will fall away without pain. It is proven'*²

*'Seek some ants with their eggs and powder, have this powder blown into the tooth through a quill, and be careful that it does not touch another tooth'*²

In two cases the powder was to be placed in a cavity, evidence that the extraction was being attempted because of carious destruction:

*'Take ivy (Hedera helix) gum and leaves, burn them into a powder in a new earthen pot, mix this powder with the juice of the herb petty spurge (Euphorbia peplus), and insert the paste in the tooth so as to fill the cavity. It will cause the tooth to fall from your jaw, but have a care that it does not touch another tooth.'*²

*'Take the roots of nightshade with black berries (Solanum nigrum), and pound them well in goat's milk, then add the black berries separately pounded thereto, incorporate the whole into a pulp, and macerate in vinegar for xiii days; renew the vinegar three days, then powder the residue and add vinegar thereto for three times more, when this has cleared, decant the vinegar, and dry the sediment in the sun or near the fire in the like heat. Let the powder be put in the tooth if there be a cavity therein, and it will extract it without pain, and without delay'*²

Compendium of Medicine

The Compendium was written by Gilbertus Anglicus in c.1240AD, a very large collection of medicinal recipes, grouped by the area of the body which they were aimed to treat.⁴ It was well regarded by physicians,

since it contained little that was based on pure superstition.⁵ In the early fifteenth century the Latin text was translated into Middle English.⁴ This MS is housed at the Wellcome Institute for the History of Medicine (MS 537). It is bound in sheepskin and is practically all written on paper.⁴ Although Gilbert lived and practised in England, it is thought that he was either trained in Italy, at Salerno or possibly in France.⁴

Chapter 6 discusses diseases of the mouth and includes recipes to overcome bad breath, known as 'Stynking of þe mouþ' [Stinking of the mouth]. Gilbert lists three causes: corruption of the teeth and gums, stomach problems or lung disorder.⁴ If the teeth and gums are responsible any rotten flesh should be removed. A gargle made from birch (*Betula sp.*) and mint (*Mentha sp.*) soaked in wine ('wiyñ þat birche or myntis ben y-soden yn') is also recommended.⁴ After which the gums are rubbed with a strong linen cloth until they bleed ('þe gummes be wel rubbid with a sharpe cloþ vnto þey bleden').⁴ In this condition, the patient should chew marjoram (*Origanum majorana*), oregano (*Origanum vulgare*), mint (*Mentha sp.*) and pellitory (*Anacyclus pyrethum*) leaves and rub the masticated mixture into his gums.⁴ If decayed teeth were responsible they should be rubbed with burnt powdered deer antler.⁴

Altering the diet could also cure bad breath. One should drink every evening wine infused with hyssop (*Hyssopus officinalis*), cinnamon (*Cinnamomum zeylanicum*), spikenard (*Nardostachys jatamansi*) or cubeb (*Cubea officinalis*) and avoid food that is hard to digest ('grete metis').⁴ Quite sensibly, Gilbert advised patients to wash the mouth and carefully rub the gums and teeth after every meal so that, 'no corrupte mater abyde amonge þe teeb'.⁴ He also recommends a dentifrice of pepper (*Piper sp.*) (*Mentha sp.*) and salt:

'And make him to chewe þid poudir a good while in his mooþ, and then swolle it down'⁴

He concludes that if all of these medicines fail ('and if þe stenche is not destroyed by alle þes manneris of medicynes') you should mask the smell by sucking pills made from sweet-smelling spices ('pillulis y-holden in þe mooþ of swete-smellyng spices').⁴

Chapter 7 is devoted to the teeth and considers toothache, worms in the teeth and rotting of the teeth.⁴

According to Gilbert toothache was caused by various factors, but imbalance of the four humours: fire: hot and dry (choleric); water: cold and wet (phlegmatic); earth: cold and dry (melancholic) and air: hot and wet (sanguine) were mainly responsible:

- (i) humours descending to the teeth, this often affects the upper teeth ('þe ouer-teeb')
- (ii) stomach problems, in which case the posterior teeth ache ('þe nepir teeb aken')
- (iii) eating hot or cold food in quick succession
- (iv) gaps between the teeth in which food could become trapped
- (v) corrupt humours at the roots of the teeth
- (vi) overheating of the head, which would cause the cheeks to be swollen and red
- (vii) due to coldness, which would cause the cheeks to be pale and the teeth to be cold
- (viii) due to moisture, which would cause the cheeks to be swollen and soft
- (ix) due to dryness, which would cause hardness but little swelling
- (x) due to phlegm, which would cause pallor of the cheeks
- (xi) due to melancholy, which would cause yellow discolouration of the cheeks
- (xii) strong humours affecting the teeth, this leads to tooth worms or cavitation of the teeth

Treatment therefore varied depending on the 'cause' of the toothache. In several cases bloodletting was advised.⁴ However, if excessive coldness was responsible it was important not to bleed but rather repeatedly place and remove a cup to the neck.⁴ Toothache could be overcome by inhaling smoke from burnt wet roses (to combat heat) or from incense (to combat cold) or from burnt henbane (*Hyoscyamus niger*) and leek (*Allium porrum*) seeds.⁴ The latter appears to have been copied from the work of Roger of Parma.¹

If the posterior teeth were affected due to stomach problems, one should chew purslane (*Portulaca oleracea*) and bitter-sweet (*Solanum dulcamara*) soaked in vinegar.⁴ One could cure pain in the upper teeth caused by humours descending from the head if one placed an ointment of mastic, clay mixed with iron oxide, dried juice of the dragon's blood tree (*Calamus draco*) all mixed with egg white on the temples.⁴ One could also lay cold mint (*Mentha sp.*) poultice on the chin.⁴

However, if the pain is very severe ('if the ache be ful greet') one must apply externally a poultice of henbane (*Hyoscyamus niger*) and opium (*Papaver somniferum*) and place on the tooth, or in the tooth, a mixture of galbanum (*Ferula sp.*) gum myrrh (*Myrrhis odorata*) and opium (*Papaver somniferum*). The fact that the latter should be placed in the tooth indicates pain associated with carious destruction. If all the remedies fail, Gilbert says the

pain without swelling must come from some type of worm ('sum worme'). Other causes of incurable pain being corrupt humours and rottenness.⁴

He concludes the chapter with two remedies for toothache. First you make round pastilles, the size of a filbert, from galbanum (*Ferula sp.*) and ivy (*Hedera helix*) gums, blended with powdered oak gall (*Quercus sp.*) and ginger (*Zingiber officinalis*). These are placed inside a vinegar-soaked cloth bag that is placed against the painful tooth.⁴ Or one should take nine sage leaves (*Salvia officinalis*); nine stalks of red nettle (*Urtica sp.*) and nine peppercorns (*Piper sp.*).⁴

Gilbert then discusses worms in the teeth. He says that at first the severe pain ('þe ache is ful kene') may be overcome by inhaling the smoke from hot henbane (*Hyoscyamus niger*).⁴ Possibly the burnt henbane seeds resembled small worms leading to the view that the worms had fallen out of the teeth. He then lists a wide range of herbal remedies to overcome toothache caused by the worm. As in the previous section, the treatment is influenced by humoral theory. If the pain is due to excessive blood (sanguine or hot and wet) one could simply bleed the patient.⁴ A hot dry pain (choleric) should be treated with a fumigation of cold herbs, including henbane (*Hyoscyamus niger*).⁴ Marjoram (*Origanum majorana*) is recommended for pain caused by excessive cold.⁴ It could be mixed with horsemint (*Mentha sp.*) and wine to make a gargle or applied as a poultice with honey and salt or styrax (*Styrax sp.*) gum.⁴ If the pain is associated with mucous discharge (phlegmatic, cold and wet) one should inhale the hot and dry smoke of powdered incense and cloves (*Caryophyllus aromaticus*).⁴

One should bite on a vinegar-soaked bag containing powdered pepper (*Piper sp.*), dried perineal glands of the beaver, stavesacre (*Delphinium staphisagria*) and spurge (*Euphorbia sp.*) to overcome pain in the posterior teeth due to stomach problems.⁴ Toothache in the upper jaw, due to humours descending from the head, should be treated with a gargle of wine flavoured with hyssop (*Hyssopus officinalis*), pellitory (*Anacyclus pyrethum*), spurge (*Euphorbia sp.*) and pepper (*Piper sp.*).⁴ Also a hot poultice of ammoniac gum and powdered sulphur was thought to be beneficial.⁴ Or else one should place the following mixture on the temples: powdered incense, mastic and spikenard (*Nardostachys jatamansi*) mixed with egg white.⁴

Gilbert also mentions remedies for toothache that he does not relate to humoral imbalance. These include holding a cloth soaked in red nettle (*Urtica sp.*) juice and wine on the cheek.⁴ A poultice made from nettle (*Urtica sp.*) roots, or

cinquefoil (*Potentilla reptans*) or wall germander (*Teucrium chamaedrys*) soaked in vinegar could be placed externally.⁴ Another made from salt and polypody (*Polypodium vulgare*) could be placed on the cheek or in the nose.⁴ One recipe suggests placing powdered pepper (*Piper sp.*) and garlic (*Allium sativum*) juice in the ear of the unaffected side.⁴ Another advocates pouring watercress (*Nasturtium officinalis*) juice into the ears.⁴

Or one could repeatedly chew pellitory (*Anacyclus pyrethum*) that had been soaked in vinegar.⁴ Another remedy was to chew four or five grains of stavesacre (*Delphinium staphisagria*), or mastic, or galbanum (*Ferula sp.*) gum.⁴ A powder to rub onto the teeth consisted of ginger (*Zingiber officinalis*), pepper (*Piper sp.*), pellitory (*Anacyclus pyrethum*) and costmary (*Chrysanthemum balsamita*).⁴ A mixture of alum, salt, columbine (*Aquilegia vulgaris*), vervain (*Verbena officinalis*), marjoram (*Origanum majorana*) and mint (*Mentha sp.*) could also be placed on the affected tooth.⁴

However, Gilbert admits that all of these treatments might fail. If so one must administer strong opiates, including henbane (*Hyoscyamus niger*) and opium (*Papaver somniferum*).⁴ Finally, if the pain persists one must extract the tooth ('drawe oute þe toob')⁴ This appears to be one of the very few documentary references advocating extraction. However, if the pain is due to excessive cold he states that extraction should not be attempted, 'it is perilouse to drawe oute a toob'.⁴

Gilbert writes a short section on rottenness of the teeth. He states that causes of toothache ('Rotenes of teep comeþ of þe same enchesons þat þe toep-ache comeþ').⁴ In order to prevent tooth rot one should rub the teeth with either a mixture of powdered cinnamon (*Cinnamomum zeylanicum*), and mastic, or powdered marjoram (*Origanum majorana*) and mint (*Mentha sp.*), or nitre [saltpetre].⁴ Other preventative medicines include a blend of myrrh (*Myrrhis odorata*), agrimony, vervain (*Verbena officinalis*), oak galls (*Quercus sp.*), from which ink is made ('þat enke is made of'), and frankincense.⁴ He also mentions something that you should not do. Namely, do not rub the teeth with very hot spices as this will promote tooth rot ('but it is not good to rubbe teep with ri3t-hote spicis, for þei wol make hem to root þe rapir').⁴ Gilbert also states that it is profitable, after eating, to dry ones teeth with a dry linen cloth.⁴ He concludes with the sensible advice that one must clean your teeth and ensure that no food debris becomes trapped as such corruption or decay will make them rotten.⁴

The Surgery of Theodoric

Theodoric, a northern Italian surgeon, wrote his *Chirurgia* in Latin in 1267AD. Two fragmentary MSS of his text are known from fourteenth century England, now housed at Oxford and London.⁶ His main area of interest was the treatment of wounds and fractures. One section refers to fractures of the maxilla and the mandible, which include reference to suturing and splinting as well as multiple fractures:

*'A fracture of the mandible or maxilla, or of some other part of the face, if associated with cuts or abrasions, should, after the wound has been thoroughly cleansed, have the lips of the wound brought together as perfectly as the ingenuity of the physician can devise; and the separated portions of the skin and flesh should be rejoined as accurately as they were in the healthy state; and, if it should be necessary, according to the size of the wound, let it be sutured. And after applying a little bolstering pads, according to previous teaching, bind it up skilfully'*⁶

'If the lower mandible is fractured, the diagnosis is easy. Therefore, when you wish to set it, if it should be the right mandible, introduce the index finger and half of the left hand into the mouth of the patient. And if the left mandible is broken, then introduce the fingers of the right, and manipulate the fracture medially and laterally, and push any protuberance of the fracture outward from within. And with your other hand outside, line it up properly in normal relationship. And its alignment is determined from the alignment of the teeth, which are in it.

*But if the mandible is broken in two places, then apply traction with the aid of an assistant. And while the assistant holds it, then the physician may align it as we have said, until its normal relationship is re-established. Then bind the teeth thus separated and displaced to one another with gold or silver wire or silk, holding them firmly so that they cannot be distracted'*⁶

After reduction the broken bones are bandaged:

'...one should apply a dressing of four layers of linen cloth. This should be of such width that it will cover both extremities of the broken bone, at least by one finger or a little more. Then smear it on one side only with egg white and fermented meal mixed in equal parts. After the egg white has been well wrung out of it, and it is thoroughly soaked, spread it over the site of the fracture in the aforementioned fashion. Afterwards, have available two rounds of good tow, of which one is thicker than the other, though both should be thick and long enough to

*accommodate the broken bone of the mandible. And both should be completely immersed in white of egg afterwards rung out. Then place the thicker one on the throat side of the mandible next to the fracture, so that it holds down one end of the cloth dressing which was first placed over the fracture. Place the other smaller pad on the others side of the broken mandible, against the maxilla, so that it holds down the other end of the aforesaid cloth dressing'*⁶

A third layer of albumen soaked bandage is then applied. Theodoric states the importance of the physician being:

*'..expert and prudent as to bind it in such a way that the dressings cannot be moved from their places and the broken bone cannot be disturbed'*⁶

He also advocates that you should:

*'put a splint over the fractured mandible, or a piece of sole leather properly fitted, if that is available'*⁶

However, he is of the opinion that if the fracture is properly bandaged it will 'heal perfectly without these things'.⁶ If all goes well the bandage should be left in position for ten days, however if 'too much pain or unbearable itching besets the patient' the bandage should be removed and the wound re-bandaged.⁶ Other possible complications include 'displacement of the fracture, in which case the bones must be re-aligned and bound up again'.⁶ The patient should be 'kept quiet and be calm and silent; and his food should be liquid' and after 20 days the bone should be successfully re-united.⁶

Rosa Anglica Medicinæ

John of Gaddesden wrote the *Rosa Anglica* in Latin around 1314AD.⁷ John was the first physician of distinction to be trained, based mainly on books, in England.⁷ Four copies of his MS are housed in the British Library. His work became very popular and was widely used by non-medical readership but was not so well received by his colleagues. The French surgeon, Guy de Chauliac, stated that 'it was a stupid rehash of the worst of medical lore'.⁷ Indeed, a great deal was copied from earlier works and it contained a large amount of charms, sympathetic medicine and folklore, but hardly mentions astrological influence.⁵ Despite, apparent limitations, he became court physician to Edward II.⁷

John's section on toothache includes many prayers and charms. He mentions that anyone who prays to St Apollonia on her feast day (February 9th) will be cured of toothache.⁸ St Apollonia (dc249AD) was an

elderly deaconess of Alexandria who was martyred by having all her teeth extracted and was then burnt alive.⁹ One charm involved repeatedly drawing three vertical lines on parchment (to represent running water) while touching the painful tooth with one's finger.⁸ He also mentions that, 'some say that the beak of a magpie hung from the neck cures pain in the teeth'.⁸ Apparently, he is not convinced by this particular charm. He also states that you should prick a 'many footed worm which rolls up in a ball when you touch it', with a needle. You then touch the aching tooth with the same needle and, 'the pain will be eased'.⁸ Obviously, a reference to pain transference from tooth worm to the worm-like centipede.

He makes reference to the fact that the fat of a green tree frog¹⁰ or dried crow dung¹¹ can be used to make decayed teeth fall out. He also suggested that applying a partridge brain will make a carious tooth fall part and the brain of a hare applied to an edentulous jaw will lead to regeneration of the teeth.¹¹ We move onto firmer ground, when John mentions that he has actually seen someone dislocate his jaw by yawning.⁸ He describes it as a 'rare accident' and provides the following method of reduction:

*'...an assistant should hold the patient's head while the surgeon puts his thumb into the mouth, and after moving the jaw from side to side he must extend it suddenly until the upper and lower teeth are on a level, then let him reduce it. Another method, which is successful if carried out as soon as the dislocation has happened, is for the patient to give himself a sharp blow on the chin, in a backward and at the same time upward direction. A friend who is present may be asked to do this'*⁸

However muscular resistance (*durites*) may be a problem, in which case:

*'the patient may be put in a bath and the durites rubbed with oil. Then the patient should lie on his back and the surgeon should place his thumb in the mouth as aforesaid. The assistant, standing behind the patient, is to steady the condyles of the jaws just under the ears, and when the surgeon has extended the jaw sufficiently he can press them into place'*⁸

John considered that sudden death could attend yawning because evil spirits might be able to enter the body through the open mouth.⁸

Chirurgia Magna

The leading French doctor Guy de Chauliac wrote this comprehensive medical treatise

in Latin in 1363, while he was papal physician at Avignon. It was translated in the late fifteenth century into Middle English (Bibliothèque Nationale, Paris: MS anglais 25).¹² Consequently, this classic work would be available to several well-educated English doctors in the late medieval period. The MS contains illuminated capitals as well as 21 sketches of surgical instruments.¹²

Guy was aware of the writings of the famous Arabian physicians Haly Abbas, Avicenna and Albucasis and bases his treatment of mandibular fractures on their work. This includes ligaturing the sound teeth by means of a well-waxed thread or by silver or gold wire.¹² Then the fracture must be well bound up with bandages and also a leather splint ('a splent of a pece of lether'). Guy advises that one may need to use many layers of bandages so as to provide a strong support to the injury ('make many wrappynge by þe same manner til þat the byndinge be wel strengþede').¹² The patient must not be allowed to chew anything. Following the Arabian physicians, Guy suggests a period of 20 days of fasting.¹²

Guy also discusses toothache and tooth rot, basing his remedies on the humoral theory as advocated by the Arabic physicians.¹² He outlines several precautions against dental problems: do not eat hot and cold food in rapid succession; do not chew hard objects such as bones; or soft things such as figs (*Ficus carica*) or honey based foods and avoid leeks (*Allium porrum*) which weaken the teeth.¹² Discoloured teeth should be washed in a mixture of wine flavoured with horsemint (*Mentha sp.*) and pepper (*Piper sp.*).¹² However, he points out that problems of the teeth are traditionally dealt with by barbers or tooth drawers ('barboures or tothe drawers') rather than doctors ('leches'). Perhaps aware of several unskilled tooth drawers, he says that they must be dressed as doctors and overseen by doctors.¹² Guy considers that a doctor should be able to cure dental diseases.¹² Methods include herbal gargles; pastilles; fumigations; purges as well as cautery.¹²

Severe pain should be lessened with an opiate, such as opium (*Papaver somniferum*).¹² If all the herbal remedies fail one must cauterise the area with hot oil or hot iron or else extract the tooth.¹² Guy actually refers to the use of dental tools for the extraction ('drawe it out with instrumentz').¹² Indeed, he is one of the few authors to mention the necessity of dental instruments. He advocates the following instruments; razors ('rasoures'); spatulae ('spatures'), straight and curved; simple elevators ('symple leuours'); two-branched elevators; pliers; ('pynsounes') several

probes ('dyuers serchours') and curettage knives ('schauynge knyfes').¹² Guy apparently advocated the removal of excessive calculus, with a file ('If þe tope were encresede ouer kynde, even it, and playn it sliely with a file, and move it nou3t').¹²

Following Albucasis, Guy was aware of the problem of transferred pain.¹² If you have to extract a painful tooth, you must ensure that you extract the diseased one. ('þat þou be noght begiled and þat þou take not a good tope for an yvel').¹² You then expose the root of the tooth and gently move it in all directions. It may be necessary to use a simple or two-pronged elevator. You then take hold of it with your pincers and remove tooth and root ('and drawe it out wiþ his rotes'). If any root remains you should try to extract it. Then give the patient a gargle of salt wine and you can also use wine spiced with myrrh (*Myrrhis odorata*) and frankincense.¹²

Guy mentions that earlier authors did suggest that teeth could be extracted by applying special powders.¹² He lists several examples, but there is no evidence that he considered them to be efficacious. One powder contained pellitory (*Anacyclus pyrethum*) and mulberry (*Morus sp.*) and caper roots (*Capparis spinosa*), arsenic as well as grease from a wood or a tree frog.¹²

In the case of carious teeth he advocates first an antiseptic gargle made of wine mixed with mint (*Mentha sp.*), sage (*Salvia officinalis*), pepper (*Piper sp.*) or pellitory (*Anacyclus pyrethum*).¹² After this you fill it ('afterward fille it') apparently a reference to conservative dentistry, over two hundred and fifty years earlier than other English sources.¹³ The early filling material was composed of gall nuts, pig grease, mastic, myrrh (*Myrrhis odorata*), sulphur, camphor, beeswax, arsenic and asafoetida and such other things ('gallia and with schere gresse, with mastik, with myrre, with sulphre, and wiþ campher, with wexe, wiþ arsenyk, wiþ ass fetida and with suche opere').¹² The final words, 'with such other things', and the lack of quantities leads one to the conclusion that Guy may not have used the filling material himself. If the filling is unsuccessful, he advocates removing part of the tooth in order to avoid food becoming trapped in the cavity.¹² The next step would be to cauterise the tooth. If this failed the last resort was extraction. However, the cavity should first be filled with cloth or cotton so that the crown does not break when the extraction is attempted.¹² If worms are found to be in the hole, one should suck pastilles made from crushed pellitory (*Anacyclus pyrethum*), onion (*Allium cepa*), and henbane (*Hyoscyamus niger*) seeds, mixed with goat grease.¹²

Loose teeth can be secured with gold chain or wire.¹² However, if they fall out

one can make false teeth. He states that the dentures can be made either made from human teeth or from cow bone ('make hem of oþer menis teeþ or of a kowes bone'), such dentures will give long service ('he may be serued with hem long tyme').¹² The use of human teeth clearly represents an early example of 'Waterloo teeth'.

DISCUSSION

Based on extant twelfth to fourteenth century documents, it appears that the major dental problem was toothache. Treatment was largely based on herbal remedies. However, charms and magic are used in the Welsh sources and the *Rosa Anglica*. John of Gaddesden, the author of the *Rosa*, thought that it was possible for teeth to regenerate and also held the Anglo-Saxon view that evil spirits could enter the body via an open mouth.

Gilbert Anglicus and Guy de Chauliac mentioned effective pain relief, including the use of opium (*Papaver somniferum*) and oil of cloves (*Caryophyllus aromaticus*). Marshmallow (*Althaea officinalis*), ivy (*Hedera helix*) and thorn apple (*Datura stramonium*) were still used in twentieth century rural England to soothe injuries, burns and insect bites.¹⁴ Pellitory (*Anacyclus pyrethum*), which was used as a cure against bad breath, toothache and caries is in fact known to promote salivation.¹⁵ Alum and pomegranate (*Punica granata*), mentioned by Roger of Frugard as ingredients in a lotion to overcome suppuration, are astringents.¹⁵ Alum, is also used by the Welsh physicians to combat gangrene and soreness. Sage (*Salvia officinalis*) is an ingredient in both a dentifrice and a gargle in Welsh sources and used by Gilbert Anglicus to combat toothache is still a popular soothing mouth rinse.¹⁶

The Physicians of Myddfai, Gilbert Anglicus and Guy de Chauliac all refer to pain or decay being caused by a tooth worm. This is an idea that was first mentioned in Babylonian medicine.¹⁷ The 'tooth worm' was discussed by first-century AD Roman authorities including Pliny and Dioscorides.¹⁸ It was also referred to in late Anglo-Saxon documents³ as well as Arabian sources.¹⁹ Also, the medieval cure for 'tooth worm', inhaling the smoke of hot henbane (*Hyoscyamus niger*) seeds, was mentioned by the Roman doctor, Scribonius Largus.¹⁸ However, in Welsh sources, the use of nightshade (*Solanum nigrum*) to overcome painful caries appears to be a native tradition. The latter contains hyoscamine and therefore would have a similar affect to henbane.

Guy de Chauliac makes the earliest reference to a filling material for a carious tooth. However, he does not know all the ingredients, which suggests that the recipe was

copied, perhaps incompletely, from earlier sources and that he had not used it himself. There are very few references to extraction, although Gilbert Anglicus does state that if pain cannot be assuaged one must 'drawe oute þe tooþ'.⁴ Guy is one of the few authors to mention dental instruments. His methods of gently loosening a tooth, and packing a carious tooth, prior to extraction are based on Classical sources and were advocated by Celsus.¹⁸ Guy also refers to false teeth made from 'oþer menis teeþ or of a kowes bone'. The treatment of mandibular fractures outlined by Theodoric and Guy de Chauliac are similar and have been copied directly from Arabic sources. The use of a green tree frog advocated in the *Rosa Anglica* and *Chirurgia Magna* has also been derived from the Arab physician, Avicenna.¹⁰

The Welsh sources appear to be based largely on local knowledge and contained many readily available ingredients and herbal remedies. Also the *Rosa Anglica*, which included recipes of limited value was popular with non-medical specialists. This is in strong contrast to other English MSS, many of which were copied in monastic scriptoria and could be regarded as works of art rather than medical treatises *per se*. Certainly, by the later thirteenth century the clergy were taking very little part in the practise of medicine.²⁰ As such, the documents were only available to a small group of mainly university-trained physicians.²¹ The latter, based in major urban centres would charge expensive fees.²¹ The vast majority of the population probably never came into contact with the recipes or procedures mentioned in the MSS. Certainly, ingredients such as cloves and frankincense mentioned by Gilbert Anglicus and Guy de Chauliac would be too expensive for all but the richest patients. Similarly, very few people would drink spiced wine every evening.

CONCLUSION

Documentary evidence suggests that care of the teeth was largely limited to non-invasive treatment. The favoured cures were based on herbal remedies and also charms and amulets to cure tooth worm. Depending on the training of the practitioner, the treatment would be strongly influenced by humoral theory. In some cases, inability to afford medical treatment, or a doctor's lack of success, led the sick to fall back on prayer and pilgrimage as the only hope of a cure.

The medieval documents refer to cosmetic and conservative dentistry. There were liquids to whiten teeth, methods of removing calculus and compounds for filling cavities. There is also a reference to dentures made of human teeth or cow bone. Surgery is known for oral cancer and fistula as well

as the repair of mandibular fractures. However, these texts would only have been available to an elite group of physicians or surgeons. All of whom who would be based in either the university towns or the larger cities and only the richer townsfolk would be able to afford their high fees. The majority of the population lived in small villages or isolated communities. They would probably have to rely largely on local barber surgeons and their own traditional remedies to treat dental problems.

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Appendix A The Hagiographic Literature

In the medieval period, one possible solution to an apparently hopeless case was to make a pilgrimage to the shrine of a Saint, in the hope of a 'miraculous cure'. At five shrines, between 1150–1220AD, some 1,067 separate medical problems were cured.²² However, dental problems were rarely cured by miraculous intervention. One case is known from Canterbury. William Patrick, a servant was cured of toothache after seeing a vision shortly after the death of St Thomas a Becket.²³ Apparently the pain had been so severe that it had:

*'caused him such paroxysms that he had almost been put under restraint as a madman'*²³

An interesting case dated to 1172AD concerns Gaufrid, a native of Norwich living in Canterbury.

'Gaufrid...was afflicted with severe toothache, and on the advice of his friends, had the three teeth in his left jaw which pained him the most, extracted. He thought little of the matter and went to a supper - with evil results. For seeing on the table a dish of excellent white peas, and a fat goose with garlic (Allium sativum), he was tempted by gluttony and partook of all of them to satiety, and he also drank new ale: but this meal, so ill-suited his case, was followed by a severe attack of pain and swelling. This increased until his whole head swelled so much that he presented the appearance, not of a man but of some portentous and horrid monster: his skin was stretched like a bladder so that those who saw him wondered that it did not break. The prominence of the nose was reduced to flatness; the eyes were sunken and dimmed: the mouth closed by the swelling of the lips and the power of breathing obstructed. So that his friends inserted a reed into his mouth to enable him to breathe, lest he should be suffocated by the choking of the passages. What more? As his anguish continued, he was taken by his friends to the already glorious tomb of the glorious martyr and archbishop Thomas. Here he

*spent the night, and with such groanings as he could utter, besought relief from his pain. At dawn he slept a little and saw in a dream that most merciful martyr and archbishop standing by him, who said, "Gaufrid what seekest thou her?" "Lord" said he, "that thou wouldst have pity on me and recover me of my sickness". The Saint answered, "Thy healing is not here: but, lest thou should be deprived of all profit from coming to me, I will give thee counsel. Rise then, and return home: make a candle in the name of Saint William the martyr of Norwich; put it about all thy head and thou shalt receive speedy relief; when thou art healed, hasten to Norwich and offer the candle to thy liberator". At this the sick man awoke, rose, returned home, and hastened to accomplish the matters enjoined upon him. Wonderful event, and truly amazing! He put the candle all about his head in the name of St William, and at this point, on the left side of the throat, where the end of it came, the skin cracked and burst as if pricked by an awl, and a great discharge came out. The swelling subsided with extraordinary quickness; the pain departed and the sick man recovered'*²⁴

The detailed description appears to represent a genuine case of post-operative infection. The pain and swelling came on some time after the extraction of his teeth. The fact that it occurred while he was eating a large supper, was, in the hagiographic literature, attributed to his gluttony. The infection ('severe attack of pain and swelling') was associated with massive abscess formation ('whole head swelled so much....his skin stretched like a bladder.'). The pain was relieved by the bursting of the abscess ('burst as if pricked with an awl, and a great deal of discharge came out'), possibly related to the heating and blistering of the skin. The abscess 'subsided with extraordinary quickness...the pain departed'. Quite possibly, Gaufrid did visit the shrine of St Thomas and receiving no remission of pain he decided to return home to Norwich and pray to St William. After he had made the decision to journey to Norwich the abscess burst and of course this was attributed to saintly intervention.