ween 1993 and 1996. Folders of patients below the age of 16 were excluded. Bitewing radiographs from the selected cases were extracted for inspection and analysis. All radiographs of low or poor diagnostic yield were excluded (8, 9). The bitewing radiographs were viewed on a viewing box with the extraneous light shut out and no room lighting. All canes lesions were diagnosed and accepted only when there was a unanimous agreement between the two examiners (authors). The bitewing radiographs were inspected for evidence of recurrent caries appearing under and around existing restoration extending into the dentine, for primary approximal caries and for overhanging proximal amalgam restorations. The diagnosis of primary approximal caries was made on the visible evidence of radiolucency at the contact area of the tooth directly adjacent to an existing cl. Il amalgam restoration in the proximal tooth or where there was radiological evidence of radiolucency within or on the enamel surface of the approximal wall of a posterior tooth. The radiolucency might or might not extend into the dentine. A proximal restoration was considered to have an overhang when there was a visible ledge of radiopaque filling material extending beyond the anatomical shape of the tooth. Evidence of enamel decalcification, wholly or partially within the tissue, was regarded as incipient caries. A total of 2446 teeth were viewed. 1247 were maxillary posterior teeth and 1199 mandibular posteriors. Only one radiograph of any one quadrant of the mouth was selected wherever more than one radiograph of that quadrant had been available and were deemed to have been taken at the same visit.

Great care was taken to ensure that there was no duplication of the teeth where more than one radiograph of that quadrant, in the same course of treatment, had been found in the folder.

DISCUSSION

The normal anatomical contact areas of the posterior teeth make the conventional clinical examination of these areas for caries lesions difficult, if not impossible, in most cases.

INTRODUCTION

Radiography is one of the most reliable sources of information for the diagnosis of dental caries. Routine mouth examination requires good illumination and access. These two factors are readily available in the examination of the anterior segments of the mouth but are however usually variable in the posterior segments. Approximate surfaces of the anterior teeth are accessible to direct visual and tactile inspection. In those areas where there may be doubt fibre optic transillumination can be employed (1). Transillumination has equally been claimed to be a valuable diagnostic tool in the detection of approximate caries (2). The observed trend in the reduction of dental caries prevalence should reflect a fall in the number of obvious canes cavitations. Incipient caries however require a more sensitive form of diagnosis if it is to be treated early. This clinical change in the prevalence, of caries has necessitated the need for early and accurate diagnosis (3, 4, 5, 6). Bitewing radiographs, of the posterior segments have been found to be clinically useful and efficient (7). It is accepted that radiographic diagnosis should be a confirmation usually, of all the other clinical evidence available. Radiographic diagnosis is an adjunct to the conventional mirror and probe inspection. The aims of this paper are.

I - To demonstrate the clinical convenience of bitewing radiographs in the posterior regions of the mouth for the diagnosis of:
  a. Approximal primary caries,
  b. Recurrent caries secondary caries,
  c. Restoration overhang.

II - To discuss possible management strategies for the prevention of recurrences.

MATERIALS AND METHOD

A random selection of 305 folders was made from the folders of all the completed treatment cases of patients who had attended Irbid Health Centre in Jordan between 1993 and 1996. Folders of patients below the age of 16 were excluded. Bitewing radiographs from the selected cases were extracted for inspection and analysis. All radiographs of low or poor diagnostic yield were excluded (8, 9). The bitewing radiographs were viewed on a viewing box with the extraneous light shut out and no room lighting. All canes lesions were diagnosed and accepted only when there was a unanimous agreement between the two examiners (authors). The bitewing radiographs were inspected for evidence of recurrent caries appearing under and around existing restoration extending into the dentine, for primary approximal caries and for overhanging proximal amalgam restorations. The diagnosis of primary approximal caries was made on the visible evidence of radiolucency at the contact area of the tooth directly adjacent to an existing cl. Il amalgam, restoration in the proximal tooth or where there was radiological evidence of radiolucency within or on the enamel surface of the approximal wall of a posterior tooth. The radiolucency might or might not extend into the dentine. A proximal restoration was considered to have an overhang when there was a visible ledge of radiopaque filling material extending beyond the anatomical shape of the tooth. Evidence of enamel decalcification, wholly or partially within the tissue, was regarded as incipient caries. A total of 2446 teeth were viewed. 1247 were maxillary posterior teeth and mandibular posteriors. Only one radiograph of any one quadrant of the mouth was selected wherever more than one radiograph of that quadrant had been available and were deemed to have been taken at the same visit.

Great care was taken to ensure that there was no duplication of the teeth where more than one radiograph of that quadrant, in the same course of treatment, had been found in the folder.
Diagnostic aid such as fibre-optic transillumination (FOTI), applicable in the anterior region, cannot be conveniently employed in the posterior situations at least when compared with the ease and convenience of the bitewing. Though, FOTI had been used in diagnosis in the posterior area in some investigations (2). The use of the dental floss for the detection of surface roughness or break in the enamel has been useful but limited in manoeuvrability. Bitewing radiographs are well suited to revealing evidence of approximal lesions (4, 5, 6). However the radiographic diagnosis of caries frequently underestimates the true lesion depth (10, 11). The opposite opinion also holds (12). Primary approximal caries is better diagnosed utilizing the direct clinical probing with mirror and probe to detect the slightest break or roughness; on the surface of the enamel using bitewing radiographs for confirmation. In situations where the bitewing radiograph reveals the carious lesions as wholly within the enamel a preventive management should be adopted and the tooth kept under observation. Large proportions of carious lesions confined to the inner or outer half of the enamel up to, but not beyond the amelo-dentinal junction do often progress for many years. Such lesions should also be kept under observation and the preventive regime initiated (13). The preventive management of such lesions will be based on the patient’s caries experience. Serial bitewing radiographs are taken as a record of the stages of the development or progress of any caries lesion, using a film holder, beam aiming and tube collimating device which can be reproduced on each occasion. The serial radiographs can also reveal the regression of some approximal caries lesions, if any (6). Fissure sealant and fluoride application are the remedies for the prevention and arrest of caries process. Where there has been frank cavitation or increased radiolucency penetrating the amelo-dentinal junction and the dentine the conventional restorative management is adopted.

Recurrent caries
Secondary caries usually occur at the interface of tooth and restoration (14). Marginal degradation of amalgam restorations in a proximal cavity cannot be detected on bitewing radiographs. Recurrent canes are detected through clinical probing and visual inspection for evidence of ditching. Ditching, however, is an inconclusive evidence of recurrent caries (14). The bulk of secondary caries occurs out of sight at the cervical margins of cl. II restorations (15). Those cases that are detectable on the radiograph are found as radiolucent areas well into the dentine. Recurrent caries and secondary caries are the same phenomenon. Residual caries has a different aetiology, attributed to the incomplete removal of the caries at the first instance. Residual caries cannot be specifically diagnosed as such either by clinical examination or on radiographic evidence. The diagnosis could be done using disclosing dyes and staining methods (16, 17). In the present analysis the diagnosis was limited to the radiographic findings. It was therefore not appropriate for the diagnosis of residual caries, which could only be done when the restoration had been removed. Residual caries may be arrested caries, which may be wrongly diagnosed as new disease but better left in place.

The prevalence of amalgam overhangs in the posterior teeth with proximal restorations is well-documented (18, 19). The diagnoses were made, in many cases, by combining radiographic evidence and direct clinical probing. No complementary clinical assessment was carried out in this analysis. The findings confirmed the higher occurrence of overhangs in the maxilla than in the mandible (18). Of the likely number of factors responsible for the overhangs three are noted:
1 - The technique and skill of the operator,
2 - The anatomical shape of the tooth being restored, and,
3 - The physical properties of the material, used for restoration.

The technique and skill of the operator demands the correct placement of the rubber dam around the tooth to be filled. This should be followed by the application of the appropriate matrix metal band, properly adapted to the box margin with suitable wedges. The rubber dam should extend beyond the floor of the proximal box to prevent the introduction of aberrant and carved filling materials in the soft tissues. Application of wedges, in the embrasure space helps to adapt the matrix band to the curvature of the tooth, below its contact area. The fact that these manoeuvres have to be carried out using indirect vision through the medium of the mouth mirror may explain, in part, the higher incidence of the failures, overhangs and recurrent caries in the maxilla. Operations in the maxilla thus call for skill and dexterity. The morphology of some teeth specifically demands meticulous attention to the placement of the wedges and their proper adaptation. On the
completion of the filling the wedges and matrix band are removed. A length of dental floss is wound round the index fingers of both hands and the intervening length of floss, eased through the contact areas from the occlusal surface of the restored tooth, interproximally. The floss should be gently worked in an apical direction towards, the gingival margin of the restored tooth. A gentle but firm sliding and sawing motion of the floss, held firmly against the approximal wall of the tooth, is executed starting below the gingival margin of the restoration and worked towards the occlusal surface. This action would remove any excess or overhanging filling material in the interproximal space and render the restoration flush with the cavity gingival margin. Alternatively, sickle probe could be used to achieve the same result by gently introducing it from the buccal side, below the contact area to appear on the lingual side of the tooth. It dislodges any particles within the space. The physical composition and shape of the amalgam alloy particles and its proper manipulation will ensure the integrity of the marginal fit of the restoration.

**CONCLUSION**

Routine bitewing radiographs are useful and reliable diagnostic supplements in the posterior dental arches. The radiographs provide an efficient and less expensive method of checking completed restorations and can also anticipate other complaints of the dental tissues. This is a useful tool in the preventive philosophy for monitoring the progress of caries lesions. The bitewing radiograph is generally accepted as one of the highly efficient diagnostic aids for the posterior approximal caries lesion. This acceptance and dependence can only be guaranteed and justified if the technical and human contributions conform to the established, guidelines (20).

Table 1 : Primary approximal caries, recurrent caries and overhanging amalgam restoration

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Maxilla</th>
<th></th>
<th>Mandible</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total No of teeth</td>
<td>No affected</td>
<td>%</td>
<td>Total No of teeth</td>
</tr>
<tr>
<td>Recurrent caries</td>
<td>1247</td>
<td>69</td>
<td>5.53</td>
<td>1199</td>
</tr>
<tr>
<td>Primary prox. cades</td>
<td>1247</td>
<td>276</td>
<td>22.13</td>
<td>1199</td>
</tr>
<tr>
<td>Overhanging amalgam filling</td>
<td>1247</td>
<td>51</td>
<td>4.08</td>
<td>1199</td>
</tr>
</tbody>
</table>

22.13 % of teeth in the maxilla had primary approximal caries and 4.08% had overhanging amalgam restorations. In the mandible 15.34% of the teeth had primary proximal caries and 2.83% had overhanging amalgam restorations.

Table 2

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Total No. of teeth</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent caries</td>
<td>114</td>
<td>4.66</td>
</tr>
<tr>
<td>Primary approx. caries</td>
<td>460</td>
<td>18.8</td>
</tr>
<tr>
<td>Overhanging amalgam filling</td>
<td>85</td>
<td>3.47</td>
</tr>
</tbody>
</table>

114 teeth (4.66%) had recurrent caries. 460 teeth (18.8%) had primary approximal caries and 85 teeth (3.47%) had overhanging amalgam restorations. Of the 2446 posterior teeth viewed in the radiographs 659 (26.94%) had pathology. 396 (60.1%) of those with pathology were located in the maxilla and 263 (39.9%) in the mandible. In all the aspects examined, the percentages of the affected teeth were higher in the maxilla than in the mandible. The percentage of amalgam overhangs was higher in the maxilla than in the mandible.
RESUME

Les radiographies dentaires de routine sont un élément utile et fiable du diagnostic des affections de l’arrière du palais. Il s’agit d’une méthode efficace et peu coûteuse pour vérifier la reconstitution des tissus et prévoir de nouvelles affections éventuelles. C’est un instrument préventif efficace pour contrôler l’évolution des lésions carieuses. La radiographie dentaire est généralement considérée comme un instrument particulièrement efficace de diagnostic des lésions carieuses interdentaires du fond de la bouche. Mais l’emploi régulier et systématique de cette pratique ne se justifie que si elle répond aux normes reconnues en tenue de compétence humaine et de niveau technologique.

Mots-clés : Diagnostic, Caries.

REFERENCES

11 - WHITE, STUART. C, LARS HOLLENDER, BARTON M, GRATT Comparison of xeroradiographs and film for detection of proximal surface caries. JADA vol 108 May 84; 755 - 759.
20 - CHADWICK BL & DUMMER PHM Factors affecting the diagnostic quality of bitewing radiographs. BDJ vol 184 No. 2 Jan 1998, 80 - 84.