THE NORTH, SOUTH, EAST AND WEST OF OCCLUSION

Dr Tom Bereznicki BDS (Edin)
At one end of the spectrum are dentists who believe that they can go through their working lives with scant regard for their patient’s occlusion. They seem to believe that essentially they can conduct their practice ignoring the occlusal consequences of the treatment that they perform daily. This is bizarre given the fact that very few dental treatments do not involve the occlusal surfaces of teeth.

Conversely there is a body of opinion that considers occlusion to be such a central pillar in our working lives and to be of such systemic import to the well-being of our patients, that occlusion takes on an almost mystic importance and attracts cult-like devotion. This can lead some dentists to advocate occlusion as being the key to resolving or preventing a range of disorders far removed from the masticating re-system, for example prolapsed lumbar discs.

The danger is that both of these approaches lead to inappropriate levels patient care; patients suffer through either over or under treatment.

S Davies et al
It is a common criticism of dentists that our dental schools ignore the third part of the masticatory system, the articulatory system, in their teaching. It appears that dentists feel that their time at university did not prepare them adequately in this area.

The inescapable fact that almost all dental treatment has an occlusal consequence, it is wrong to consider the study of the articulatory system to be less important than either of the teeth of the periodontal tissues.

No practising dentist can care well for their patients without having regard for good occlusal practice.

S Davies et al
NON-WORKING SIDE INTERFERENCE
EXTRACTION ALLOWS THE DEVELOPMENT OF PROPER GROUP FUNCTION TO PROTECT THE CANINE WHICH IS ROOT TREATED AND HAS A METL POST
OCCLUSAL DETERIORATION STAGE 1

THE INITIAL LOSS OF OCCLUSAL HARMONY RESULTS IN THE LOWER DISTO-BUCCAL CUSP OF THE LAST STANDING LOWER MOLAR DRIVING INTO THE CONTACT POINT BETWEEN THE TWO UPPER MOLARS AND ACTING LIKE A WEDGE. THE UPPER LAST MOLAR IS SLOWLY PUSHED DISTALLY, MOBILITY INCREASES AND EVENTUALLY IT IS LOST SPONTANEOUSLY.
OCCLUSAL DETERIORATION STAGE 2

THE SAME PROCESS NOW BEGINS WITH THE UPPER MOLAR PALATAL CUSP DRIVING INTO THE INTERPROXIMAL CONTACT BETWEEN THE TWO LOWER MOLARS. EVENTUALLY, THE LAST LOWER MOLAR BECOMES SO LOOSE IT HAS TO BE EXTRACTED.
BASIC PRINCIPLES

• In normal occlusions Centric Relation (CR) should be coincident with maximum Intercuspation (ICP) - ???

• In lateral jaw excursions there should ideally be Canine Guidance or Group Function with or without Canine Guidance

• With the lower jaw in Working Side (WS) there should be no contacts on the Non-Working Side (NWS)

• In protrusive jaw movements all the contacts should be on the anterior teeth with no contacts on the posterior teeth

• Any undesirable contacts are known as premature contacts or prematurities in centric and interferences if in lateral and protrusive excursions

• Ideally there should be Anterior Guidance also known as a Anterior Protected Occlusion
“Most responses to occlusal disharmony are adaptive in nature. The possibility of converting a patient with a symptom free ‘adapting occlusion’ to one which is uncomfortable because of “high fillings” increases with the number and complexity of the restorations - moreover the response varies between individuals”

M Wise
CENTRIC
WHERE SHOULD THE CONDYLES BE?

Fig. 54.—Diagram to represent condylar positions. A, In the RCP the condyle is positioned superiorly with its anterior surface seated by way of the disc (shaded) against the posterior facing slope of the eminence. B, The condyle is not superiorly positioned. C, The condyle is retruded (by the dentist) but not superiorly positioned. B and C are incorrect.

Courtesy of Michael Wise
“A centric occlusal interference often occurs during mandibular closure between maxillary mesial-facing cusp inclines and mandibular distal-facing cusp inclines. As a result the mandible is deflected anteriorly and possibly also laterally”

Fundamentals of Fixed Prosthodontics – Shillingborg/Hobo/Whitsett
Centric occlusion can be described as the occlusion the patient makes when they fit their teeth together in maximum intercuspation. Common synonyms for this are Intercuspation Position (ICP) or Habitual Bite

Centric Relation is not an occlusion at all. CR is nothing to do with teeth because it is the only ‘centric’ that is reproducible with or without teeth present.

It can be paraphrased as being the uppermost and foremost position of the mandible relative to the maxilla, with the articular disc in place, when the muscles that support the mandible are their most relaxed and least constrained position. The head of the condyle is thus in its terminal hinge position.

It is a reproducible position – if registered correctly it would be the same even if different dentists were involved in the recordings

S Davies et al
WHERE SHOULD THE CONDYLE BE IN CENTRIC?

THE IMPORTANT THING ABOUT CENTRIC IS THAT IT IS REPRODUCABLE BY ANYONE

IN RCP THE CONDYLE IS POSITIONED SUPERIORLY WITH THIS ANTERIOR SURFACE SEATED BY WAY OF THE DISC AGAINST THE POSTERIOR FACING SLOPE OF THE EMINENCE

— M Wise

THERE ARE MANY TECHNIQUES TO FIND THIS HINGE AXIS

— SEE ARTICLES

ICP - THE RELATIONSHIP OF THE MANDIBLE TO THE MAXILLA WHEN THE TEETH ARE MESHED MAXIMALLY TOGETHER

— M Wise

RCP - THE POINT OF INITIAL OCCLUSAL CONTACT THAT HAS OCCURRED FOLLOWING CLOSURE IN RETRUCED ARC OF CLOSURE

— M Wise

IN 80%+ OF PATIENTS ICP WILL BE APPROXIMATELY 1 MM ANTERIOR TO RCP — M Wise
DO WE NEED TEETH TO FIND CENTRIC?
SHOULD RCP = ICP?
THE PERFECT BITE? ICP MAY BE UP TO 1mm ANTERIOR TO RCP
THE CONCEPT KNOWN AS **LONG CENTRIC**

DOES IT MATTER IF CR AND ICP ARE NOT COINCIDENT? NO! BUT ONLY IF THERE ARE NUMEROUS EVEN CONTACTS BETWEEN THE UPPER AND LOWER TEETH

The concept of allowing some freedom of movement in an anterior and posterior direction is known as long centric. Long centric is 0.5-1.0 mm of free space between CR position and maximum intercuspation **without** a change in the vertical dimension of occlusion.

In some advanced cases where the upper anterior teeth are being restored, if the centric contacts provided on the palatal surfaces of the crowns are in CR the patient will feel “locked” and uncomfortable. The long centric needs to be re-established by extending the centric stops on the palatal surfaces of the restored anterior teeth to allow the freedom of movement the patient requires to feel comfortable.
Figs (a) SHOW NORMAL OCCLUSAL CONTACTS, Figs (b) SHOW THE FREEDOM PATIENTS REQUIRE IN LONG CENTRIC
PARTICULARLY IF RESTORING UPPER ANTERIOR TEETH WITH CROWNS OR DENTURES, IT IS EASY TO LOCK THE PATIENT INTO RCP AND DENY THEM THE FREEDOM THAT THEY WERE USED TO PREVIOUSLY WHEN THEY HAD LONG-CENTRIC. THE PATIENT WILL FEEL INCREDIBLY UNCOMFORTABLE AND FEEL “LOCKED”. THE NEWLY PLACED ANTERIOR RESTORATIONS WILL REQUIRE ADJUSTMENT TO RE-INTRODUCE THE FREEDOM OF MOVEMENT THAT THE PATIENT WAS USED TO.

THIS IS EASIEST TO ACHIEVE BY GETTING THE PATIENT TO SIT UP AND TAP ON ARTICULATING PAPER
CENTRIC/INTERCUSPAL
CONFORMATIVE V REORGANISED
ARE ICP AND RCP COINCIDENT HERE?
A DIFFICULT PHOTO TO TAKE BUT THE FIRST CONTACT POINT IS ON THE PALATAL EDGE OF UL3 AND THEN ON SQUEEZING THE TEETH TOGETHER THERE IS A SLIDE LATERALLY LEFT TO ICP WITHIN THE FOSSA
THE CLINICAL OCCLUSAL PICTURE IS CONFIRMED BY FACEBOW MOUNTING STUDY MODELS ON A SEMI-ADJUSTABLE ARTICULATOR. RESTORATIONS HAVE TO BE PROVIDED IN THIS CENTRIC OCCLUSAL RELATIONSHIP NOT IN INTERCUSPAL ie THE TREATMENT IS CARRIED OUT AS A RE-ORGANISED CASE AND CANNOT BE RESTORED IN CONFORMATORY FASHION
AND HERE?
THE PATIENT COMING INTO RCP IN THE HING AXIS ARC OF CLOSURE
THE INITIAL POINT OF CONTACT IN THE CENTRIC ARC OF CLOSURE IS SHOWN ON THE ARTICULATED STUDY MODELS. BY REORGANISING THE OCCLUSION AND WORKING TO SUFFICIENT VERTICAL HEIGHT IS ACHIEVED TO ALLOW ROOM FOR THE RESTORATIVE MATERIAL
THE PATIENT CANNOT POSSIBLY BE RESTORED PREDICTABLY UNLESS THE TREATMENT IS CARRIED OUT AND REORGANISED IN RCP
OVERERUPTED WISDOM TEETH ARE A COMMON CAUSE OF CENTRIC PREMATURITIES
WHEN YOU SEE TILTED MOLARS IN THE POSTERIOR QUADRANT, THERE ARE OFTEN CENTIC PREMATURITIES IN THE AREA
WHEN THERE IS FOOD PACKING BETWEEN THE LAST TWO STANDING MOLARS, BUT THERE IS A TIGHT CONTACT WHEN FLOSS IS PASSED THROUGH THE CONTACT AREA, IT MEANS THERE MAY BE A CENTRIC PREMATURITY - THIS OPENS THE GAP BETWEEN THE TWO LAST TEETH AS THE PATIENT CLOSES HIS TEETH TOGETHER ALLOWING FOOD TO PACK. THE GAP CLOSES AS SOON AS THE PATIENT OPENS HIS MOUTH.
TOOTH POSITION IS DICTATED BY THE NEUTRAL ZONE
IN THE PRESENCE OF PERIODONTAL DISEASE, OCCLUSAL FORCES, DUE TO LOSS OF VERTICAL DIMENSION IN THE POSTERIOR SEGMENTS, CAN RESULT IN THE FRONT TEETH MIGRATING AS WELL AS SUFFER ACCELERATING BONE LOSS – SPLAYING. A LARGE CENTRIC PREMATURITY WILL CAUSE THE SAME PROBLEM.
A DIASTEMA THAT APPEARED IN A MATTER OF WEEKS SHOWING SPONTANEOUS CLOSURE IN ONE WEEK FOLLOWING OCCLUSAL ADJUSTMENT. ONLY THE PREMATURE CONTACT BETWEEN THE LOWER MOLAR AND THE OVERERUPTED UPPER SECOND MOLAR WAS REMOVED.
THIS DIASTEMA APPEARED OVER A PERIOD OF SEVERAL MONTHS. THE UNDERLYING BONE LOSS WAS LONGSTANDING AND PERIODONTAL CONDITION STABLE. A LOSS OF VERTICAL DIMENSION FOLLOWING OCCLUSAL WEAR/ EROSION WAS DIAGNOSED
SPONTANEOUS SPACE CLOSURE IN 2 MONTHS FOLLOWING OCCLUSAL ADJUSTMENT OF PREMATURITIES IN CENTRIC AND RELEIVING THE HIGH OCCLUSAL FORCES ON THE UPPER ANTERIOR TEETH BY RE-SHAPING THE PALATAL SURFACES AND/OR THE INCISAL EDGES OF LOWER INCISORS
2008 – NEW VENEERS
2016 – PATIENT PRESENTS WITH TWO DIASTEMAS THAT HAD RECENTLY APPEARED
2 WEEKS POST OCCLUSAL ADJUSTMENT OF CENTRIC PREMATURES IN THE POSTERIOR QUADRANTS
STABILITY AND TOTAL CLOSURE 6 MONTHS LATER
SIMPLY RE-ARRANGING THE OCCLUSION CAN LEAD TO SPONTANEOUS RESOLUTION OF TOOTH MAL-ALIGNMENT

THE PATIENT’S IMMEDIATE UPPER DENTURE WAS FABRICATED WITH AN INCREASED VERTICAL DIMENSION TO ALLOW THE ESTABLISHMENT OF A NORMAL CLASS 1 ANTERIOR RELATIONSHIP – THE LOWER ANTERIOR TEETH RE-ALIGNED SPONTANEOUSLY WITHIN 2 MONTHS. THE FINAL RESTORATION IS AN ACRYLIC/TITANIUM SCREW-RETAINED FULL ARCH BRIDGE
Working Side Interference

Infers a heavy or early occlusal contact towards the back of the mouth during an excursive movement

S Davies et al
THE MECHANICS OF OCCLUSION CAN BE COMPARED TO A NUTCRACKER
FORCES IN BRUXING CAN BE 10X THAT DURING NORMAL FUNCTION AND GO UP TO BETWEEN 300 AND 900 psi
CANINE RISE
IDEALLY THERE SHOULD BE A PROGRESSIVE SMOOTH TRANSLATION FROM THE CANINE TO THE LATERAL TO THE CENTRAL INCISOR
GROUP FUNCTION

IF CANINE GUIDANCE IS NOT POSSIBLE, GROUP FUNCTION SHOULD BE PRESENT, IDEALLY INCLUDING SOME CANINE GUIDANCE. THE TOOTH CONTACTS SHOULD BE AS ANTERIORLY PLACED AS POSSIBLE OR EVENLY DISTRIBUTED BETWEEN ALL THE TEETH AS SHOWN BELOW.
“AS SOON AS THERE ARE ANY LATERAL EXCURSIONS OF THE LOWER JAW, OCCLUSAL CONTACTS SHOULD PASS TO THE FRONT TEETH, IDEALLY IN CANINE GUIDANCE OR IN GROUP FUNCTION IN ORDER TO PROTECT THE POSTERIOR TEETH FROM LATERAL FORCES”
WHAT WOULD ONE EXPECT HERE?
IS THIS GROUP FUNCTION?
WOULD YOU REGARD IT AS BEING POSSIBLE CAUSE OF FUTURE PATHOLOGY?
CROSS-OVER IN WORKING SIDE

Dawson Academy 2009 – Why Porcelain Breaks and Chips

CORRECT CROSSOVER DISCLUSION

IT IS NOT BY CHANCE THAT THE MOST COMMON ANTERIOR AESTHETIC FRACTURE IS TO THE MAXILLARY LATERAL INCISOR. PROPER OCCLUSAL DESIGN DICTATES A SMOOTH TRANSITION TO THE INCISAL EDGE OF THE MAXILLARY CENTRALS AS THE PATIENT MOVES BEYOND THE CANINE IN LATERAL EXCURSION. WHEN THIS POSITIONING IS OVERLOOKED, EXCESSIVE LOADS CAN BE PLACED ON THE DISTAL OF THE LATERAL INCISORS LEADING TO FRACTURE.
BE AWARE OF **WORKING SIDE LINGUAL CUSP INTERFERENCE** – THE EXCURSION SHOULD TRAVEL SMOOTHLY FROM THE CANINE TO THE INCISORS AND NOT CATCH IN THE MOLAR AREAS IN EXTREME MOVEMENT BEYOND THE CANINE

“A working side interference occurs between maxillary palatal facing cusp inclines and mandibular buccal facing cusp inclines of the lingual on the working side”

Fundamentals of Fixed Prosthodontics – Shillingborg/Hobo/Whitsett
CORRECT LATERAL GUIDANCE

When the mandible moves laterally, the goal is to have immediate disclusion of the posterior teeth on the working and balancing side. When posterior teeth are allowed to contact in excursive movements, increased muscle activity, combined with the increased mechanical stress contributes to the increased chance of fracture. Creating the correct contour and the lingual of the maxillary canines is one of the most important decisions a clinician makes during the restorative process. If the cusp is too steep for the patient’s functional pattern fracture, mobility and migration is likely.

Dawson Academy 2009 – Why Porcelain Breaks and Chips
NORMAL ANTERIOR CROSS-OVER
THE PROGRESSION OF THE EXCURSION SHOULD PASS SMOOTHLY FROM CANINE TO LATERAL TO CENTRAL INCISOR AND STAY ON THE ANTERIOR TEETH UNTIL THE PATIENT CANNOT GO FURTHER LATERALLY
FITTED CROWN IS COMFORTABLE IN ICP
THE BUCCAL CUSPS ARE TOO LONG AND PRODUCE INTERFERENCES IN BOTH WORKINGSIDE AND PROTRUSIVE MANDIBULAR EXCURSIONS – THE PROBABLE REASON FOR FRACTURE OF THE BUCCAL CUSPS AND NEED FOR A CROWN – LOOK AT THE FRACTURE LINES ON THE LOWER OPPOSING TOOTH.
IF THE CUSPS ARE NOT ADJUSTED TO ELIMINATE THE INTERFERENCE, THE RESULTANT HEAVY PRESSURES FREQUENTLY LEAD TO PORCELAIN FRACTURE
OR PAIN AND ASSOCIATED TMJ PROBLEMS
CROSS-OVER IN WORKING SIDE

Dawson Academy 2009 – Why Porcelain Breaks and Chips

CORRECT CROSSOVER DISCLUSION

IT IS NOT BY CHANCE THAT THE MOST COMMON ANTERIOR AESTHETIC FRACTURE IS TO THE MAXILLARY LATERAL INCISOR. PROPER OCCLUSAL DESIGN DICTATES A SMOOTH TRANSITION TO THE INCISAL EDGE OF THE MAXILLARY CENTRALS AS THE PATIENT MOVES BEYOND THE CANINE IN LATERAL EXCURSION. WHEN THIS POSITIONING IS OVERLOOKED, EXCESSIVE LOADS CAN BE PLACED ON THE DISTAL OF THE LATERAL INCISORS LEADING TO FRACTURE.
THE PONTIC FRACTURED AS THERE WAS AN ABSENCE OF SMOOTH PROGRESSION FROM THE CANINE TO THE LATERAL TO THE CENTRAL INCISOR – MOST OF THE PRESSURE WAS ON THE DISTAL CORNER OF THE LATERAL INCISOR LEADING TO PORCELAIN FRACTURE
ANTERIOR CROSS-OVER
THE PROGRESSION OF THE EXCURSION SHOULD PASS SMOOTHLY FROM CANINE TO LATERAL TO CENTRAL INCISOR
WORKING-SIDE ‘CROSSOVER’ SHOWN IN A SERIES OF SLIDES UNTIL THE INTERFERENCES APPEAR ON THE LINGUAL CUPS OF THE PREMOLARS AND ANTERIOR GUIDANCE LOST
LINGUAL CUSP HEIGHT OF BOTH PREMOLARS ADJUSTED TO BRING THE ANTERIOR GUIDANCE INTO CONTACT ON THE CENTRAL INCISORS
ANTERIOR GUIDANCE RE-ESTABLISHED
BEFORE AND AFTER OCCLUSAL ADJUSTMENT BY REDUCTION OF THE LINGUAL CUSPS – ANTERIOR DISCLUSION RE-INTRODUCED
PLEASE DON’T SAY YOU CANNOT IMAGINE ANYONE PUTTING THEIR JAW INTO THIS EXTREME POSITION IN REAL LIFE!!
ANTERIOR ‘CROSS-OVER’

As the patient moves into working side anterior disclusion appears because the LL6 lingual cusp gives a working side interference – this is the common cause of fractured lingual cusps in the molar area.
LOWER LINGUAL CUSPS WHICH BECOME WORKING SIDE INTERFERENCES CAN BE CONFIDENTLY RE-SHAPED AS LONG AS THE TEETH ARE NOT IN A CROSS-BITE. IN A CROSS-BITE THE UPPER BUCCAL AND LOWER LINGUAL CUSPS BECOME THE CENTRIC HOLDING CUSPS AND MUST NEVER BE ADJUSTED.
Non-Working Side Interference

“Is an anterior guidance on the back teeth of the non-working side during lateral excursions”

S Davies et al
Non-working side interferences are most often associated clinically with cusp-atomic fracture and TMJ problems, as well as contributing to increasing tooth mobility and bone loss in periodontal cases.

“A non-working side interference results when there is contact between maxillary buccal-facing cusp inclines and mandibular lingual-facing cusp inclines on the non-working side”

Fundamentals of Fixed Prosthodontics – Shillingborg/Hobo/Whitsett
IN A CROSS BITE THE HOLDING CUSPS ARE THE BUCCAL UPPERS AND LOWER LINGUALS
There are three forms of protrusive:

- Edge to edge
- Protrusive with anterior disclusion and posterior contacts
- Protrusive with ‘crossover’
“A protrusive interference occurs when distal-facing inclines of maxillary posterior teeth contact the mesial-facing inclines of mandibular posterior teeth during a protrusive movement”

Fundamentals of Fixed Prosthodontics – Shillingborg/Hobo/Whitsett
Edge to edge with posterior disclusion
USUALLY ONLY RESULTS IN ANTERIOR WEAR
AVOID INTRODUCING PROTRUSIVE CONTACTS WITH INCORRECTLY SHAPED RESTORATIONS
PROTRUSIVE WITH ANTERIOR DISCLUSION AND ONLY CONTACTS IN THE POSTERIOR QUADRANTS
IDEALLY THESE SHOULD BE BILATERAL – VERY DIFFICULT CASES WHEN PROVIDING CROWNS IN THESE EXTREME
PROTRUSIVE CASES
IN THE PRESENCE OF PERIODONTAL DISEASE THIS TYPE OF HEAVY PROTRUSIVE CONTACT PROSTERIORLY LEADS TO RAPIDLY PROGRESSING BONE LOSS. IN A NORMAL HEALTHY MOUTH, IN ALL PROBABILITY, MULTIPLE CUSP FRACTURES WILL BE SEEN RATHER THAN BONE LOSS.
TYPICAL ADVANCED BONE LOSS PATTERNS IN THE POSTERIOR SEGMENTS WHERE THERE IS A LOSS OF ANTERIOR GUIDANCE BY CONTACTS AT THE BACK OF THE MOUTH
TOOTH FRACTURE SEEN IN CASES WHERE THE ANTERIOR GUIDANCE IS LOST
TYPICAL RADIOGRAPHIC APPEARANCE OF OCCLUSIONS WHICH ARE LIKELY TO HAVE PROTRUSIVE INTERFERENCES
PROTRUSIVE WITH “ANTERIOR CROSSOVER”
IS ANTERIOR CROSSOVER THE CAUSE OF LOWER FIXED RETAINERS DE-BONDING?
PLACED 1986 AND STILL SUCCESSFUL
IN PROTRUSIVE CROSS-OVER AS MANY TEETH AS POSSIBLE SHOULD CONTACT TO REDUCE THE PRESSURE ON ANY ONE SPOT. IF THE PATIENT CAN ADVANCE WELL BEYOND THE CROSSOVER, CONTACTS SHOULD STILL BE AS FAR FORWARD AS POSSIBLE – IDEALLY NO FURTHER THAN THE CANINES
TYPICAL PORCELAIN FRACTURE CAUSED BY ANTERIOR CROSSOVER
COSMETIC BONDING
THE PATIENT PRESENTS WITH FAILED COSMETIC BONDING OF THE CANINE TEETH WHICH ARE IN THE POSITION OF THE CONGENITALLY ABSENT LATERAL INCISORS
Working-side – anterior disclusion

Protrusive with crossover
COSMETICALLY BONDING THE ‘LATERALS’ IS DOOMED TO FAILURE WITH THIS OCCLUSION
IF COSMETIC COMPOSITE BONDING IS TO GO AHEAD, THE LOWER CANINE TIPS NEED TO BE SHORTENED, WITH THE PATIENTS PERMISSION, IF A PREDICATABLE LASTING RESULT IS TO BE ACHIEVED
WHAT ARE THE IMPLICATIONS OF OCCLUSION IN THE PROVISION OF TREATMENT?
DIAGNOSIS
FORCES ON POSTERIOR TEETH IN NORMAL FUNCTION VARY FROM 5 TO 44 psi WHEREAS IN PARAFUNCTION THEY RANGE FROM 300 TO 900 psi
LEARN TO LOOK AND ANALYSE – THE FRACTURE THROUGH THE MESIAL RIDGE IS EASY TO SPOT. DO YOU SEE ANYTHING ELSE?
THERE IS A WEAR FACET PRESENT ON THE MESIO-LINGUAL CUSP WHICH HAS MORE THAN LIKELY CONTRIBUTED TO THE CAUSE OF THE FRACTURE. MERELY RE-FILLING THE TOOTH WITHOUT ELIMINATING THE OCCLUSAL INTERFERENCE WILL NOT PREVENT PROPAGATION OF A DEEPER PULPAL FLOOR OR CUSPAL FRACTURE.
RESTORED TEETH ARE PARTICULARLY SUSCEPTIBLE TO FRACTURE DUE TO OCCLUSAL FORCES – FILLINGS WEAKEN TEETH, THEY DO NOT STRENGTHEN THEM - AMALGAM NOT AT ALL, BONDED COMPOSITES ONLY TO A CERTAIN EXTENT
A TYPICAL PICTURE IN BRUXERS WITH LITTLE ANTERIOR GUIDANCE. APART FROM THE OBVIOUS FRACTURES, THERE IS ALSO A WORN AMALGAM. IF THE OPPOSING ‘PLUNGER’ CUSP IS NOT RE-SHAPED, THE OCCLUSAL FLOOR OF THE TOOTH BEING FILLED WILL NEED TO BE DEEPENED (ie HEALTHY TOOTH TISSUE REMOVED) TO GIVE AN ADEQUATE THICKNESS OF RESTORATIVE MATERIAL. THIS DEEPENING OF THE CAVITY WILL FURTHER WEAKEN THE TOOTH AND THE ‘WEDGING’ EFFECT OF THE NEW CUSP/FOSSA RELATIONSHIP WILL ADD FURTHER STRESS TO THE LOWER TOOTH
LEARN TO LOOK AT ABNORMAL OCCLUSAL LINES ESPECIALLY WHERE TEETH HAVE OVER-ERUPTED

LARGE PROTRUSIVE INTERFERENCE WITH RESULTANT ANTERIOR DISCLUSION
In PFM’s or any other porcelain crown, ‘pancake’ occlusal reductions and failure to reduce the buccal aspect, as shown, leads to either very thin porcelain which fractures, or poor aesthetics as there is insufficient depth of porcelain for the technician to cover the opaquer.

Alternatively, the crown is overcontoured – reduction to accommodate the occlusion runs the risk of exposing the metal substructure and if cemented ‘high’ – occlusal trauma to the tooth, pain usually with cold and pressure, increased mobility. If the porcelain fractures who pays for the remake??

Fig. 111.—Bucco-lingual diagram (Bu = buccal, L = lingual) through the first molars to illustrate: a, Functional cusps F, buccal lower, palatal upper and non-functional cusps N, buccal upper, lingual lower. b, Preparation which has a functional cusp bevel (arrowed). c, Lack of functional cusp bevel (arrow). d, Results in a high crown since the technician requires a minimal thickness for his wax. Perforation will occur during adjustment (arrow).
THIS PATIENT PRESENTED WITH PAIN IN RELATION TO LR6 – HOT COLD AND PRESSURE. IN ADDITION SHE HAD DEVELOPED ‘EARACHE’ ON THE RIGHT AND WAS FINDING IF DIFFICULT TO OPEN HER MOUTH
THE BUCCAL CUSPS LR6 HAVE BEEN OVERBUILT BY THE TECHNICIAN AND A WORKING SIDE INTERFERENCE CREATED WITH LOSS OF ANTERIOR DISCLUSION. THE ONLY VIALBLE TREATMENT WAS?
THE ONLY VIABLE TREATMENT WAS ADJUSTMENT OF THE CROWN. THE UPPER BUCCAL CUSP COULD NOT BE REDUCED AS IT WAS THE HOLDING CUSP IN A CROSSBITE. THE PATIENT WAS WARNED THAT PERFORATION AND/OR PORCELAIN FRACTURE OF THE CROWN WAS A POSSIBILITY DURING ADJUSTMENT OF THE LOWER BUCCAL CUSP IN WHICH CASE IT WOULD REQUIRE REPLACEMENT
FORTUNATELY DESPITE BEING UNDER-PREPARED, THE CROWN WAS NOT PERFORATED DURING RE-SHAPING. BEING A NON-WORKING CUSP THE REDUCTION DID NOT NEED TO BE TOO SCIENTIFIC IN ORDER TO RE-ESTABLISH ANTERIOR GUIDANCE. THE PATIENT’S SYMPTOMS ALL DISAPPEARED WITHIN A WEEK.
ENDODONTICS
TEETH UNDERGOING ROOT CANAL THERAPY SHOULD ROUTINELY BE RELEIVED OF THE BITE TO PREVENT INADVERTANT CUSPAL FRACTURE DURING TREATMENT AND PROVIDED WITH CUSPAL COVERAGE RESTORATIONS AFTER
BEWARE OF CANTILEVERING PONTICS OFF ROOT TREATED TEETH
“Some patients become exquisitely sensitive about the way their teeth meet to the extent that they are better at detecting interferences than many dentists. These patients appear to have an amplified level of sensation which can be troublesome when perceived as pain. There is often a heavy occlusal contact present - you just need to know how to look for it and adjust it. A pitfall of not recognising such a patient is unnecessary root canal treatment”

R Wassell - Occlusal pitfalls and how to avoid them – BDJ Vol 212 – No 6 – 24th March 2102
THE PATIENT HAD UR7 RCT’d BUT DESPITE THE BEAUTIFUL RCT HAD ONGOING DISCOMFORT AND WAS RELUCTANT TO PROCEED WITH CROWN PLACEMENT UNTIL SYMPTOMS DISAPPEARED.
MODELS WERE NOT TAKEN AT THE TIME THAT THE PATIENT PRESENTED FOR A SECOND OPINION BUT FROM THE ARTICULATED MODELS TAKEN FOLLOWING CROWN PREPARATION, THE MASSIVE INTERFERENCE IS VISIBLE IN PROTRUSIVE IN THE NEXT TWO SLIDES EVEN AFTER SUBSTANTIAL OCCLUSAL REDUCTION.
AT THE TIME OF THE SECOND OPINION THE PATIENT WAS INFORMED THAT THE OVERERUPTED THIRD MOLAR WOULD IN ALL LIKELYHOOD REQUIRE OCCLUSAL RESHAPING TO ELIMINATE THE INTERFERENCE AND ASSOCIATED PAIN. 2 DAYS AFTER ADJUSTMENT ALL THE SYMPTOMS DISAPPEARED AND THE PATIENT WAS HAPPY TO PROCEED WITH THE DEFINITIVE CROWN.
THE TOOTH PRIOR TO ADJUSTMENT AND RESHAPING – OVERERUPTION AND MALPOSITIONING CLEARLY VISIBLE
THE RADIOGRAPHS CLEARLY SHOW THAT THE ADJUSTMENT WAS WITHIN ENAMEL
AVOIDING FAILING RESTORATIONS
ABFRACTION
VENEERS IN BRUXERS MORE COMMONLY DEBOND AT THE GINGIVAL THIRD RATHER THAN INCISALLY DUE TO TOOTH FLEXION – SIMILAR TO THE ABFRACTION THEORY
MINIMAL PREP DOES NOT MEAN NO PREP
“Always consider, particularly if working on the last standing molar, whether there a premature contact in RCP- if there is, as soon as you carry out an occlusal adjustment there will be distal movement of the mandible and it is likely that you will require further adjustment of the occlusal surface as the vertical dimension in that area will be diminished”

Michael Wise
TAKE CARE WHEN CROWNING LAST STANDING MOLARS
“Most responses to occlusal disharmony are adaptive in nature. The possibility of converting a patient with a symptom free ‘adapting occlusion’ to one which is uncomfortable because of “high fillings” increases with the number and complexity of the restorations - moreover the response varies between individuals”

M Wise
SHOULD CROWNS BE CEMENTED HIGH?
DIFFERENTIAL WEAR COMMONLY RESULTS IN THE CREATION OF INTERFERENCES AROUND THE MOUTH
ALWAYS POLISH MEATAL OR PORCELAIN AFTER CROWN ADJUSTMENT WITH THE APPROPRIATE POLISHING KIT TO AVOID WEAR OF THE OPPOSING DENTITION

Glazed porcelain

Surface texture following adjustment with a diamond bur
Surface texture following adjustment with a diamond bur

Porcelain surface after polishing with the Meisinger porcelain polishing kit
IMPLANTS
‘Occlusal loading of a fully integrated implant can be the point of success or failure long term. Implant stability can be quickly lost if not introduced into a healthy occlusal environment – an environment where stress is minimised by good anterior guidance, posterior disclusion and good centric stops. Light occlusal stops on implant teeth need routine adjustment to maintain proper occlusal timing with the natural dentition. Occlusal overload and lateral interferences will quickly show signs of bone loss around the implants’

7 Deadly Sins of Implants – Dawson Academy, Nov ‘15
FULL ARCH IMPLANT CASES SHOULD ALSO IDEALLY FOLLOW CONVENTIONAL OCCLUSAL PRINCIPLES. REPLICATING THIS MALOCCLUSION WOULD NOT BE REGARDED AS BEING IDEAL.
THE IMMEDIATE DENTURE HAS BEEN DESIGNED TO ELIMINATE BOTH THE CROSS-BITE AND THE ANTERIOR OPEN BITE
TRIAL RUNNING THE FULL DENTURE PRIOR TO IMPLANT PLACEMENT ENSURES THAT THE PATIENT IS BOTH COMFORTABLE WITH THE OCCLUSAL AND VERTICAL DIMENSION CHANGES, AND PLEASED WITH THE NEW APPEARANCE.
THE RE-DESIGNED OCCLUSION
IMPLANT PLACEMENT AND “TEETH IN A DAY”
Ortho cases

“All clinicians involved in a multidisciplinary treatment need to be mindful of the overall duty of care to the patient – particularly the referring dentist. An assumption that the other clinician was dealing with the problem will be viewed as a very poor defence”

BEFORE AND AFTER ORTHODONTIC CASE – WHICH WAY SHOULD LATERALS POINT IN BEAUTY? - TOWARDS THE TUMMY BUTTON. RECESSION LL1 UNNOTICED AND UNTREATED DURING ORTHO TREATMENT.
WHAT WAS THE PROBLEM ON COMPLETION OF TREATMENT:

• THE PATIENT KNEW SHE HAD A RECESSION PROBLEM LOWER FRONT – WHY HAD NOTHING BEEN DONE?

• THE PATIENT HAD EXPERIENCED TMJ PROBLEMS ON THE RIGHT SIDE SINCE TREATMENT BEGAN

• THE PATIENT HAD PERSISTENT PAIN ON UL5 – PRESSURE AND HOT/COLD

  • THE PATIENT HAD ONGOING PROBLEMS WITH DISCOMFORT/MILD PAIN UR2

• WHY HAD SHE NOT BEEN FORE-WARNED THAT, AFTER 2+ YEARS OF FIXED LINGUAL APPLIANCES, SHE WOULD REQUIRE FURTHER TREATMENT WITH CONVENTIONAL ORTHODONTIC TREATMENT FOR FINAL ALIGNMENT AND THAT HER TEETH WOULD NOT NECESSARILY MEET CORRECTLY

• WHAT EXACTLY IS SHE TO DO IF THE TEETH DO NOT DRIFT BACK INTO OCCLUSION DAHL STYLE
IN THE FINISHED CASE, THERE IS A PARTIAL LOSS OF CANINE GUIDANCE IN LATERAL EXCURSION WITH VERY HEAVY CONTACT ON THE LATERAL INCISOR AND NONE ON THE CENTRAL INCISOR i.e. THE CANINE SHOULD HAVE BEEN EXTRUDED FURTHER TO PROVIDE EFFECTIVE GUIDANCE. THE PATIENT FEELS THAT THE LATERAL INCISOR SEEMS ‘BRUISED’ AND UNCOMFORTABLE ALL THE TIME. INTERESTINGLY, THE PATIENT REPORTED THAT DURING LINGUAL APPLIANCE THERAPY A GAP WOULD APPEAR IN THIS AREA DURING TREATMENT, CLOSE WHEN THE APPLIANCES WERE TIGHTENED AND THEN RE-OPEN BEFORE THE NEXT REVIEW APPOINTMENT.
CROSS-OVER IN WORKING SIDE

Dawson Academy 2009 – Why Porcelain Breaks and Chips

CORRECT CROSSOVER DISCLUSION

IT IS NOT BY CHANCE THAT THE MOST COMMON ANTERIOR AESTHETIC FRACTURE IS TO THE MAXILLARY LATERAL INCISOR. PROPER OCCLUSAL DESIGN Dictates a smooth transition to the incisal edge of the maxillary centrals as the patient moves beyond the canine in lateral excursion. When this positioning is overlooked, excessive loads can be placed on the distal of the lateral incisors leading to fracture.
OCCUSAL ANALYSIS SHOWED THAT THE ONLY CONTACT IN CENTRIC IS ON THE UPPER AND LOWER LEFT PREMOLARS.
WITH THE PATIENT IN THE INITIAL POINT OF CONTACT IN THE RETRUDED 
ARC OF CLOSURE, THE ANTERIOR AND POSTERIOR TEETH ARE A LONG 
WAY AWAY FROM MEETING ON THE RIGHT SIDE, CLOSER ANTERIORLY ON 
THE LEFT. THE ENTIRE OCCLUSION WAS SUPPORTED BY THE PREMOLARS 
ON THE LEFT SIDE. THERE WAS A SLIDE INTO INTERCUSPAL WHERE A 
FEW MORE, BUT NOT ALL, TEETH MET
THIS IS THE BEST THAT COULD BE ACHIEVED WITH OCCLUSAL ADJUSTMENT – MORE CONTACTS LEFT SIDE, BUT ONLY ONE ON THE RIGHTSIDE
PATIENT EMAIL 1 MONTH AFTER OCCLUSAL EQUILIBRATION

“I wanted to write to thank you for the adjustments you made to my teeth and the night plate the other week. A vast improvement. My bite is much more comfortable now and I am not getting the pain on the left premolars now that the pressure has been reduced. The pain in the right TMJ is also much less frequent. I was able to enjoy my holiday as a result!”
1 YEAR LATER – MOST OF THE TEETH HAVE FINALLY DRIFTED INTO OCCLUSION DAHL STYLE ALBEIT UNPLANNED
WHEN TO SAY NO
THERE IS NO SPACE TO PLACE A RESTORATIVE MATERIAL
MISCELLANEOUS
These 5 requirements of occlusal stability are:

1. Stable contacts on all teeth of equal intensity in centric relation
2. Anterior guidance in harmony with the envelope of function
The goal: lines in front, dots in back.
3. All posterior teeth disclude during mandibular protrusive movement
4. All posterior teeth disclude on the non-working side during mandibular lateral movement
5. All posterior teeth disclude on the working side during mandibular lateral movement
HOW DOES OCCLUSION DIFFER WITH IMPLANTS

Occlusion

Occlusal loading of an fully integrated implant can be the point of success or failure long term. Implant stability can quickly be lost if not introduced into a healthy occlusal environment: an environment where stress is minimized by good anterior guidance, posterior disclusion and good centric stops. Light occlusal stops on implant teeth need routine adjustment to maintain proper occlusal timing with the natural dentition. Occlusal overload and lateral interferences will quickly show signs of bone loss around the implant.
ACKNOWLEDGEMENTS

IMPLANT PLACEMENT – DR ANDREW DAWOOD
ALL CLINICAL SLIDES USED ARE MY OWN IF NOT THEN
ATTRIBUTED TO LAST YEAR’S STUDENTS
REFERENCES ATTRIBUTED AS MUCH AS POSSIBLE

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