In today's health and image-conscious society, cosmetic or aesthetic dentistry is becoming much more of a 'must have'. This first article in a series on aesthetic dentistry explores the principles of smile design, such as centre-line, symmetry, smile line, incisal plane, gingival aesthetics, proportion and axial alignment.

**CENTRE LINE**

Maximum aesthetics often hinges around symmetry and symmetry starts with the establishment of the correct centre line (Goldstein, 1977) (Figures 1 to 4). A perfectly vertical dental midline reinforces the perception of order and organisation (Frush & Fisher, 1958). Miller et al (1979) found that the centre line of the upper central incisors coincided with the median line of the face only 70% of the time. A centre line if not in the median line of the face is acceptable if it is not too exaggerated and gives an illusion of a natural dentition. Recommendations have been to place the midline precisely in the facial midline or in the middle of the mouth using the lingual papilla or labial frenum as landmarks (Heartwell, 1968). Maxillary and mandibular midlines also fail to coincide in 75% of cases. This means that the

---

**Paul Tipton BDS MSc DGDP (UK)** is a specialist in prosthodontics and runs a private referral aesthetic, restorative and implant practice at the St Ann's Dental Clinic in Manchester. He also runs one-year practical aesthetic, restorative and implantology courses.

---

**Figure 1**: Centre-line is off to the LHS by the width of extra lateral incisor

**Figure 2**: Implant placed in exact location of new central incisor position

**Figure 3**: Procera crown placed on the implant (Nobel Biocare) and veneers fitted on the maxillary incisor teeth to correct the centre line discrepancy

**Figure 4**: Final smile showing a flattened male style smile line
lower midline should not be used as a reference for the placement of the maxillary midline (Renner, 1985). The interpupillary line and the smile line of the incisal edges of the teeth create an overall sense of harmony with the centre line perpendicular to these two lines.

**Symmetry**

Subtle changes in symmetry are permissible in the form of characterisation as one moves further laterally away from the centre line. Although a facial composition may give the feeling of symmetry, it is well known that variations between both sides of a face exist and when mirror images of one side are placed together an entirely new face is created. Maxillary central incisors must be kept as symmetrical as possible within reasonable limits (Chiche & Pinault, 1994), but maxillary lateral incisors, however, display more variations in shape than centrals and are often bilaterally asymmetrical in the same mouth. Variations in the diameter of lateral incisors are wide and of greater magnitude than centrals (Sanin & Savara, 1971). The diversity of the dental reconstruction, therefore, should rely on asymmetry of the lateral incisors (Figures 5 & 6).

Attractiveness in a smile results from a general sense of parallelism and symmetry (Figures 7 & 8).

**Smile Line**

The smile line also appears to be one of the most important factors contributing to a beautiful smile. The smile line can be defined as a hypothetical curved line along the edges of the maxillary anterior teeth that has to coincide or...
run parallel with the curvature of the inner border of the lower lip. Observations show that the degree of curvature of the incisal line is more pronounced for women than for men. A flat or reverse incisal line deeply affects the degree of attractiveness of the female smile (Figures 9 to 13).

**GINGIVAL AESTHETICS**
In smiling, the position of the upper lip relative to the teeth is ideally located at the gingival margin of the maxillary central incisors and appears an important factor in attractiveness (Roach & Muia, 1988). Too much display of soft tissue results in the gummy smile (Figures 14 to 17).
INCISAL PLANE
A further principle of aesthetic dentistry is to create an overall sense of harmony and horizontal perspective by creating the occlusal anterior plane in the general direction of the interpupillary line (Roach & Muia, 1988). Many individuals exhibit some degree of canting of the maxilla which can easily be demonstrated by drawing an imaginary line across the gingival margins or cusp tips of the canines and comparing with the interpupillary line. Often, patient expectations for perfect alignment and symmetry are based on the media image (Miller, 1991). Full correction of the canted gingival plane may be required for such ‘media conscious’ patients before crown reconstruction (Figures 18 & 19).

PROPORTION
Proportion implies geometry and associating beauty with numerical values. This preoccupation with mathematical formulas as the basis of art means that, up to a point, beauty can be rationally defined and taught to a student (Pevard, 1973). Lombardi (1973) pointed to the importance of the proportion between width and length in the dimensions of individual teeth (Figures 14 to 17) and between the respective size of anterior teeth. This has been developed by Levin (1978), who observed that in pleasing dentitions viewed from the front, the width of the central incisor is in the golden proportion to the lateral incisor which is in the golden proportion to the canine. Using callipers that open at a constant golden proportion, this can be verified and used when restoring anterior teeth (Figures 20 to 22).

AXIAL ALIGNMENT
This proportion is also in evidence as one moves further
away from the midline and out into the buccal corridor and should be used together with correct axial alignment to produce a beautiful smile (Figures 23 to 26). The axial alignment of the anterior tends to be more pronounced from centrals to canines and in the posterior segment responds to the phenomenon of balance of lines around a central fulcrum. The buccal corridor, or lateral negative space, helps in achieving the gradation effect in progressively altering tooth illumination.

CONCLUSIONS
In our modern competitive society, a pleasing appearance often means the difference between success and failure in both personal and professional lives. And because the mouth is one of the focal points of the face, it should come as no surprise that the smile plays a major role in how we perceive ourselves and others (Goldstein, 1997) (Figures 27 to 29). Orthodontics is obviously needed...
one treatment modality available for centre-line and occlusal plane correction. There are a large group of patients, however, who refuse to undergo orthodontics and instead prefer a quicker restorative solution, especially when some of the teeth involved have had previous major restorations.

Acknowledgements
I would like to thank Mark Fletcher for his excellent ceramic work, Dr Mark Howdle for his periodontal surgical procedures and the restorative team at St Ann's Dental Clinic for their help with the management of these patients.

References


Q1
Where an upper centre line discrepancy exists, should the centre line be lined up with:

a) Centre line of the face?
b) Centre line of the lower teeth?
c) Upper labial frenum?

Q2
Should central incisors be:

a) Symmetrical?
b) Non-symmetrical?
c) Same size as the canines?

Q3
Should lateral incisors be:

a) The same width?
b) Differing widths?
c) Symmetrical?

Q4
What is the smile line?

a) A curved line parallel to the upper lip
b) A curved line parallel to the lower lip
c) A straight line parallel to the interpupillary line

Q5
The purpose of crown lengthening is to:

a) Correct the width/length ratio of the teeth
b) Make all the gum margins level
c) Place the gum margins at the lip line when smiling