

## Appraisal for Permutation of Bonwill-Hawley Arch Form for the Current Trends

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**Abstract:** In the mid-1960s, Dr. George Newman introduced the bonding of orthodontic brackets to enamel. Either in banding or bonding, the arch wire is configured to a specific arch form. **Aim:** The study was conducted to evaluate differences (if any) between the Bonwill-Hawley arch form for banding and bonding. **Methodology:** The difference between the two arch lengths was calculated to observe any changes from the ideal Bonwill-Hawley arch form for banding. **Results:** A difference of one millimetre was obtained between the two arch lengths. **Conclusion:** The Bonwill-Hawley arch form for bonding should have an addition of one millimetre to the total mesiodistal width of the four incisors and two-thirds of the mesiodistal width of the canine rather than the extra 3mm as proposed during banding of teeth.

**Keywords:** Bonwill-Hawley arch form, orthodontic banding, orthodontic bonding

### Introduction:

With the advent of the Edgewise appliance by Edward H. Angel, banding of individual teeth and welding of brackets onto bands began, but in the mid-1960s, Dr. George Newman introduced the bonding of orthodontic brackets to enamel. Either in banding or bonding, the arch wire is configured to a specific arch form. Since each individual

has a different arch type, a customised arch form is a necessity. In order to create a customised arch form, Hawley in 1905 gave a construction technique based on the work done by Bonwill (1885). He described an ideal arch as being constructed upon an equilateral triangle with slight modifications. The six anterior teeth were thought to be arranged on the arc of a circle whose radius was determined by the combined width of the incisors and canines, with the premolars and first permanent molars arranged in a straight line and the second and third molars turning in towards the midline. The base of the equilateral triangle was thought to represent the intercondylar width. The arch forms provided by supply companies are generally of the Bonwill-Hawley type.

**Aim and Objective:** The study was conducted to evaluate differences (if any) between the Bonwill-Hawley arch form for banding and bonding.

### **Methodology:**

The arch length measurement from the mesial two-thirds of the canine traversing the complete mesiodistal width of the four incisors up to two-thirds of the mesiodistal width of the contralateral canine was calculated by measuring with a cellophane tape and transferred to paper, which was later measured with a calibrated ruler (Fig. 1). The bonding of standard edgewise brackets was done upon the cast, after which the arch length measurement was repeated again (Fig. 2). The difference between the two arch lengths was calculated to observe any changes from the ideal Bonwill-Hawley arch form for banding.

### **Results:**

The arch length was measured from the mesial two-thirds of the canine traversing the complete mesiodistal width of the four incisors up to two-thirds of the mesiodistal width of the contralateral canine, and it came out to be 49mm before bonding in an ideal cast. After bracket placement, the arch length measured was 50mm. So, a difference of just a millimetre was obtained between the two arch lengths.

### **Discussion:**

The advantage of the Bonwill Hawley archform over other archforms was that it was individualised for each case. Its construction required the arrangement of six anterior teeth on the arc of a circle whose radius was committed to the mesiodistal width of the four incisors and two-thirds the width of the canines. To this width was added 0.5mm for each tooth to compensate for the thickness of the band between each tooth. Where the non-customised preformed archwire does not always confer the pretreatment arch form of an individual patient, this arch form stood in the need of maintaining the natural arch form of the individual without muddling the original inter-canine width. 7,8. Today, when the banding is replaced by bonding, the

fabrication of customised Bonwill Hawley arch forms requires a rational need for modification to negate the missing band thickness. Our study proposes to add an additional 1 mm to the original mesiodistal width of the four incisors and two-thirds of the width of the canines to obtain the radius of the arc. This is being done to compensate for the thickness of the stem and bracket base along with the thickness of the adhesive material placed upon the bracket, which moves the archwire into the outer circle rather than the buccal surface of the teeth. This 1mm excess measurement has been obtained upon taking the arch perimeter difference without and after bracket placement. This 1mm consolidated difference can be taken unanimously for Edgewise, Roth, and M.B.T. brackets as the change in bracket base thickness is negligible.

**Conclusion:** The Bonwill-Hawley arch form for bonding should have an addition of just a millimetre to the total mesiodistal width of the four incisors and two-thirds of the mesiodistal width of the canine rather than the additional 3mm as earlier used for the fabrication of the Bonwill-Hawley archform in the era of banding procedures with various appliance systems.

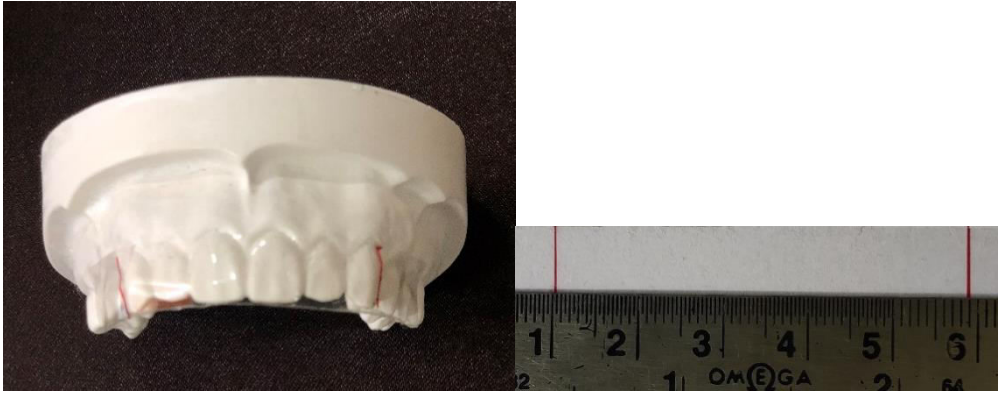
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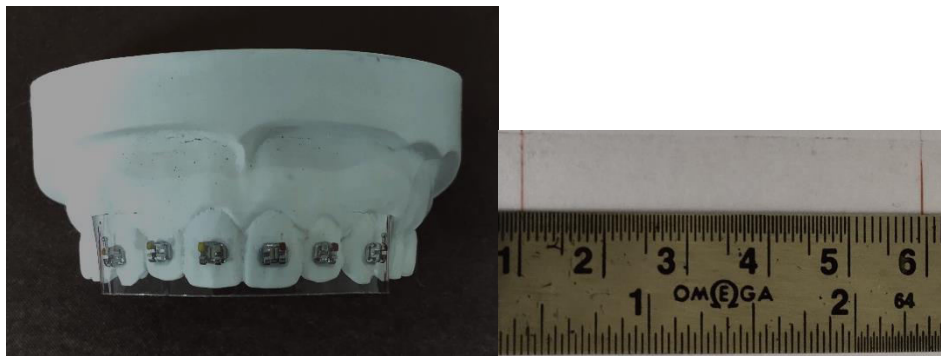
#### Figure legends

Figure 1: Measurement of arch length before bonding using a cellophane tape and its measurement by using a ruler (49mm).

Figure 2: Measurement of arch length after bonding using a cellophane tape and its measurement by using a ruler (50mm).



**Figure 1:** Measurement of arch length before bonding using a cellophane tape and its measurement by using a ruler (49mm).



**Figure 2:** Measurement of arch length after bonding using a cellophane tape and its measurement by using a ruler (50mm).