

THE IMPACT OF COVID-19 RESTRICTIONS' LED BONDING PROTOCOL ON BRACKET FAILURE RATE IN THE ORTHODONTIC DEPARTMENT AT DUMFRIES AND GALLOWAY ROYAL INFIRMARY

Project involvement:

Joanna Kociubinska-DCT1,

Dumfries and Galloway Health Board (Project lead, design, data collection, analysis and review)

Mr Philip Taylor-Specialty Doctor in Orthodontics,
Orthodontic Department DGRI (Project supervision, data collection)

Premature debonding of the brackets during fixed appliance therapy



Implications:

Causes:

- Poor patient compliance



- Poor clinical bonding technique



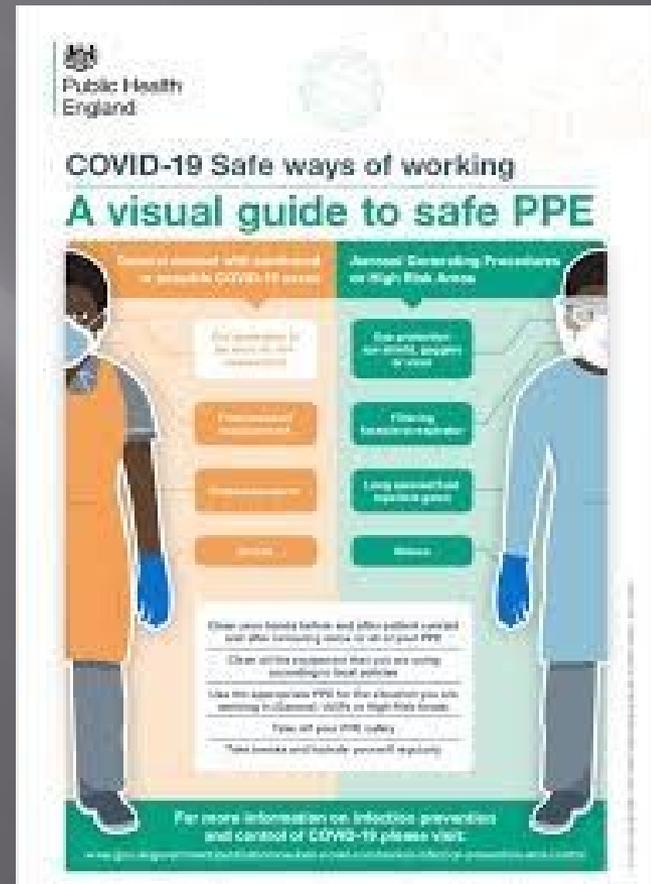
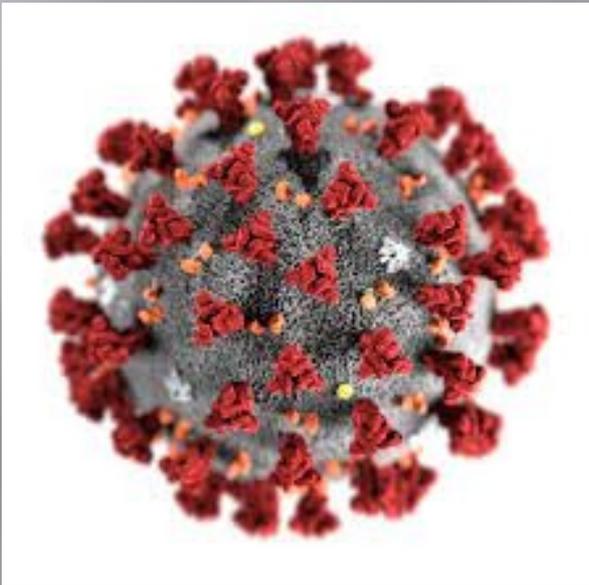
- Unsatisfactory bonding material

- Poor use of the clinician's time
- Increased material cost
- Prolonged treatment time
- Reduced efficiency of treatment provision
- Additional time out from patients' normal schedule
- Cost of travel to and from the department

Pre-Covid Self etching primer protocol (AGP procedure):

- 1.** Isolate teeth using NOLA Dry field system or cheek and tongue retractors, dri-angles and cotton rolls
 - 2.** Prophyl teeth with oil free pumice or paste, remove excess water but do not dry tooth surface. Do not allow teeth to become recontaminated with saliva before applying the Transbond Plus self etching primer
 - 3.** Once primer activated as per manufacturer instructions rub saturated tip of applicator onto tooth surface. Continue rubbing liquid onto enamel while applying some pressure for a minimum of 3-5 seconds per tooth. If bonding to aprismatic enamel e.g.: molar deciduous teeth, lingual surfaces, increase the rubbing time per tooth to achieve desirable etch pattern.
 - 4.** Redip applicator into reservoir to saturate tip before rubbing it onto next tooth.
 - 5.** Repeat steps 3-4 for each tooth
 - 6.** When all teeth on one arch are primed, use an oil and moisture free air source to deliver a gentle air burst for 1-2 seconds to each tooth to dry primer into thin film.
 - 7.** Proceed immediately with bonding. If bonding is delayed, apply another coat, deliver gentle air burst to dry primer into thin film and bond.
 - 8.** Light cure
- One Transbond Plus Self Etching Primer unit will etch and prime all teeth in one arch only.

Aim: How the new non-AGP bracket bonding protocol impacted bracket failure rate at DGRI Orthodontic Department.



Current non- AGP protocol:

- 1.** Isolate teeth with cheek and tongue retractors, dri-angles and cotton rolls
- 2.** Dry the tooth surface with cotton roll
- 3.** Apply Transbond plus (self-etching primer)-rub liquid onto enamel of each tooth for 10-20 seconds
- 4.** Redip applicator into reservoir to saturate tip before rubbing it onto next tooth.
- 5.** Repeat steps 3-4 for each tooth
- 6.** Proceed immediately with bonding. If bonding is delayed, apply another coat and bond.
- 7.** Light cure

Standards/guidelines/evidence base:

Literature search and previous audit looking at bracket failure was taken into account to agree on standard. **Gold Standard** for bracket failure rate in Orthodontic Department at DGRI was set at no more than 6%.

Type of audit:

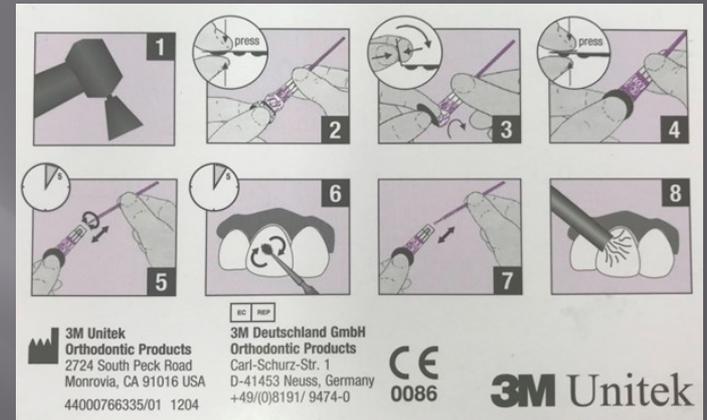
Retrospective audit to analyse bracket bonding failure rate when using protocol that strictly follows manufacturer instructions.

Prospective audit to analyse bracket bonding failure with amended bond-up protocol which avoids creating aerosols.

Sample and data source:

Retrospective audit

- 22 consecutive upper and lower straight wire cases
- September 2019 and December 2019
- Transbond Plus Self Etching Primer
- Manufacturers' instructions followed-creating AGP



Prospective audit-cycle 1

- 24 consecutive upper and lower straight wire cases
- September 2020 and December 2020
- New protocol-avoiding AGP

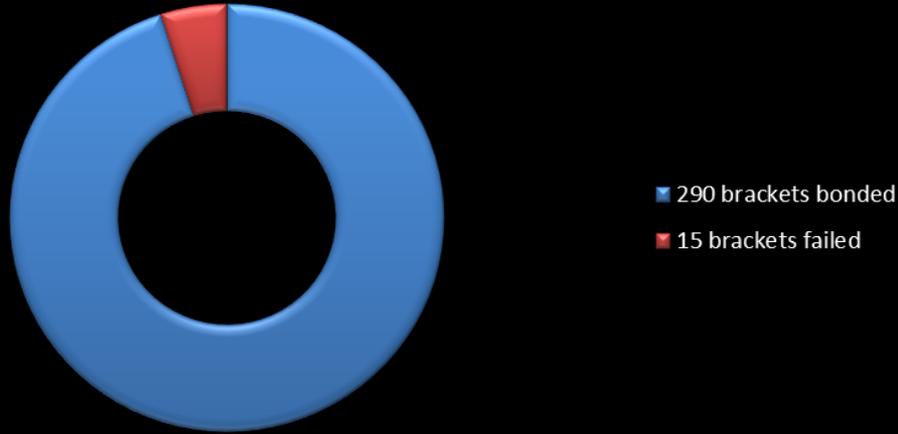
Methodology:

- Computer appointment records
- All patients with full or sectional bond-ups in the analysed period of time were included in the audit
- 22 patients included in the retrospective audit cycle(290 brackets)
- 24 patients included in the first prospective audit cycle(231 brackets)
- Patients in both audit cycles were followed up for 3 months to check for bonding failure.
- Data collected using specially designed Data collection sheet
-

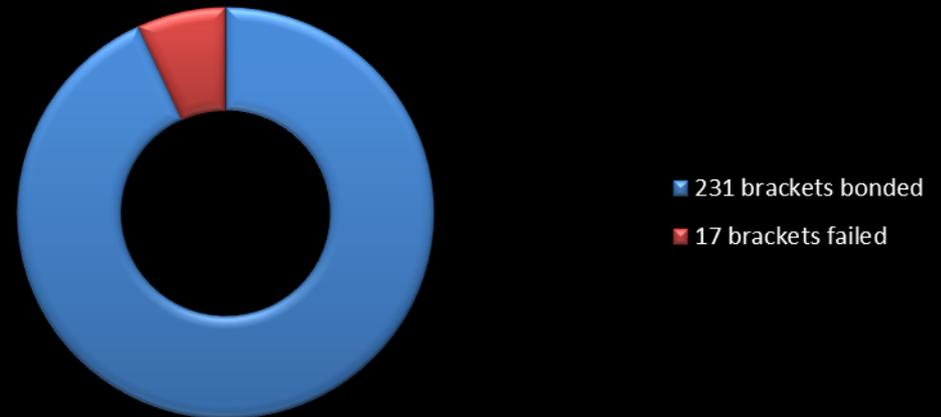
Case no	Patient name	Patient CHI number	Bond-up date	Number of teeth bonded	CAS date if needed	Number of fractured brackets	Was there any residual composite on the tooth?
1							
2							
3							

Findings :

Bracket bonding failure with AGP protocol in the first 3 months following bond-up

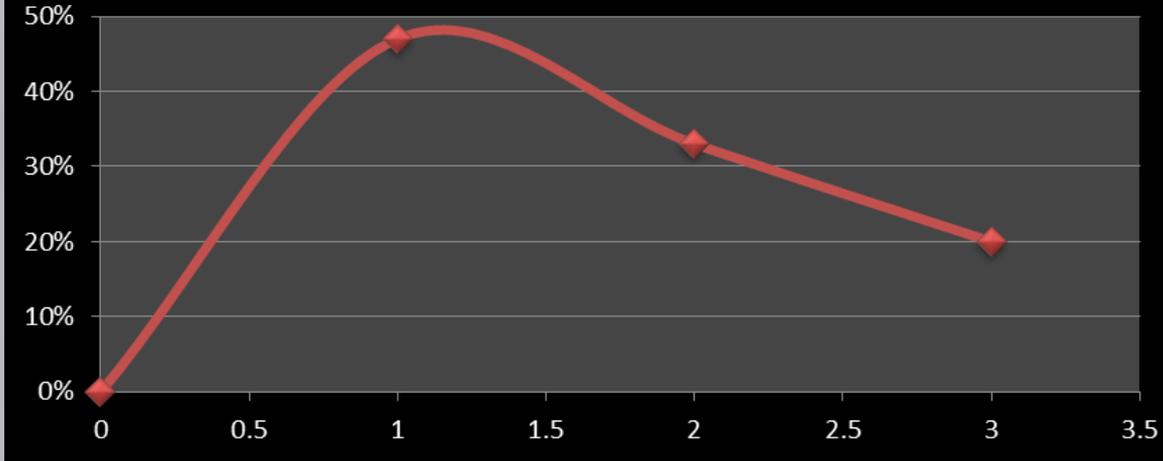


Bracket bonding failure with non-AGP protocol in the first 3 months following bond-up

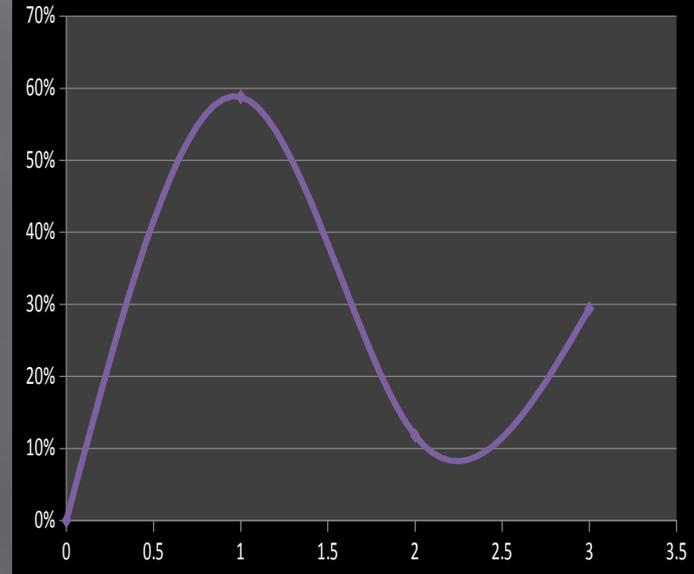


Observations:

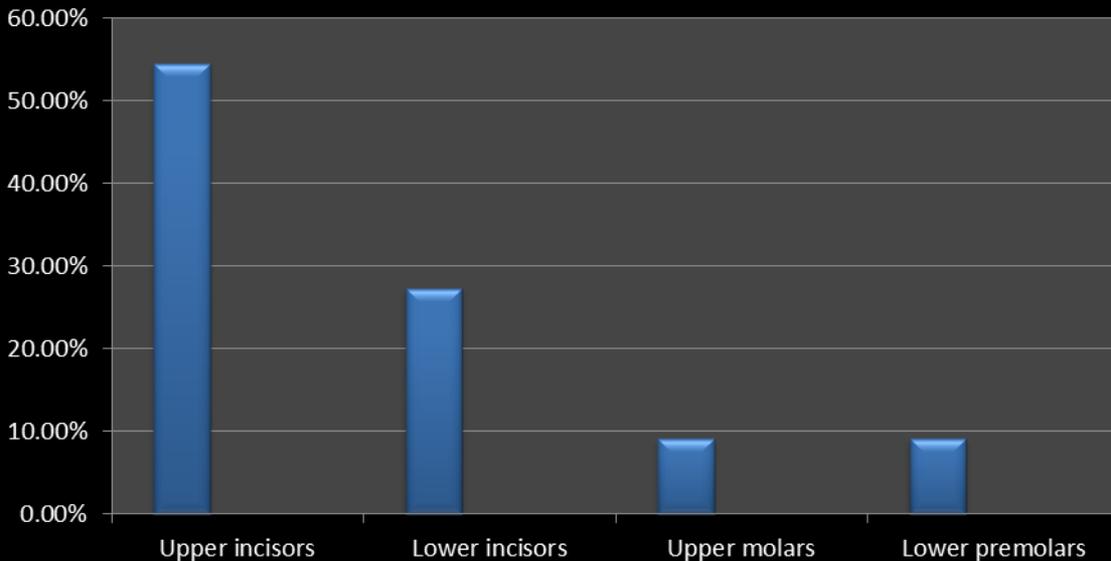
Timing of the bracket failure in the first 3 months following AGP bond-up



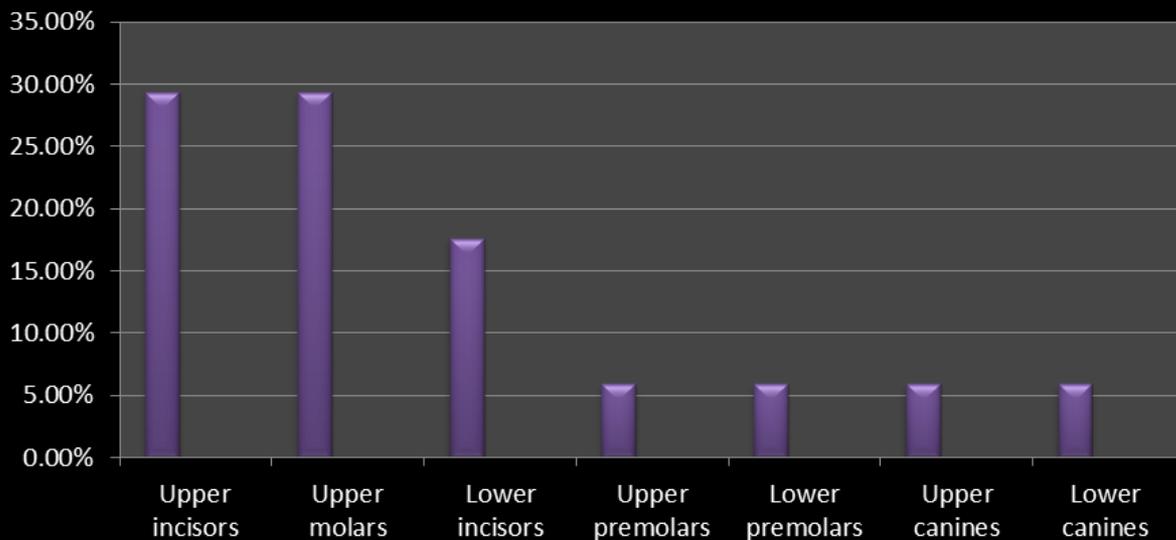
Timing of bracket failure in the first 3 months following bond up using non-AGP protocol



Distribution of failed brackets using AGP protocol



Distribution of failed brackets using non-AGP protocol



Conclusions:

- Modification of the bond-up protocol to minimise the risk of transmission during Covid-19 pandemic, led to increase in the bracket bonding failure in the first 3 months following bond-up.
- Patient compliance impact unknown due to incomplete data
-
-
-

Limitations of this audit:

- small department,
- small sample size,
- incomplete data for patient compliance impact

Recommendations:

- Amendment of bond-up protocol in line with latest BOS AGP Risk during Orthodontic Procedures-25/09/2020
BOS Table of AGP-Non AGP update 25 Sept 2020 v6.pdf
- Use of prophylaxis: Group B procedure-PPE suitable for non-AGP
- Drying surface with 3 in 1: use air separately
- Allow appropriate time for SEP to work (10-20 seconds per tooth).
- If bonding to aprismatic enamel e.g.: molar deciduous teeth, lingual surfaces, increase the rubbing time per tooth to achieve desirable etch pattern
- Use One Transbond Plus Self Etching Primer per arch as per manufacturer recommendations
- Pt's education: brace care instructions and leaflets
- Improve record keeping: patient compliance data
- Re-audit

References:

1) *Clinical performance of precoated brackets and self-etch bonding technique: a prospective comparative study. PubMed, Clinical oral investigations, 2019, 23(6), 2813-2821 | added to CENTRAL: 29 February 2020 | 2020 Issue 02 Atik E, Gorucu-Coskuner H, Taner T*
Conclusion: Precoated brackets with SEP application significantly reduced chair time without compromising bracket failure rate.

2) *A systematic review on bracket failure rate of orthodontic brackets bonded with self-etch adhesives Research Article, Drug Invention Today Vol 11, Issue 3, 2019 C.H. Balavenkata Bharathi, Ravinda Kumar Jain.*

Conclusion: Both conventional adhesive systems and the self-etch adhesives provide a satisfactory clinical performance for bonding preadjusted edgewise brackets. The bond failure rate irrespective of the system used varied from 1.57% and 11.2%.

3) *The impact of bonding material on bracket failure rate Kelly Brown*
Published: September 2009 in Vital (Nature journal).

