Comparative Success and Survival Between Hall and Conventional Preformed Metal Crown Techniques: An Umbrella Review

Amanda Tran, DDS, Jordan Caracci, DMD, Binh Phan, DMD, Leesa Jeffries, DDS, David Okuji, DDS, MBA, MS
NYU Langone Hospitals-Advanced Education in Pediatric Dentistry, Brooklyn, NY

NYU Langone Health

NYU Langone Dental Postdoctoral Residency Programs

INTRODUCTION

Oral health, in particular dental caries, have been heavy burdens on children's health and quality of life. Many children, especially from low-income families, experience significant barriers to dental care, and thus suffer from chronic caries.[1]

Hall crown technique involves placing stainless steel crowns atraumatically on primary molars without the conventional tooth preparation.[2] Hall technique was introduced to supplement a unique patient population- pre-cooperative patients or patients with behavior issues, while finance and time (poor families who experience barriers to dental care) require efficient treatment modalities.[3]

Current available research on Hall technique has demonstrated consistent clinical success and effectiveness. The body of knowledge indicates that the survival and success rates for Hall and Conventional Technique are similar, which implies that the less invasive Hall Technique may benefit children who require stainless steel crowns due to its minimal and limited use of local anesthesia and tooth preparation.

METHOD

Electronic databases and grey literature were selected to identify relevant systematic reviews and meta-analyses up to August 01, 2023. The reviewed articles focused on pediatric patients with carious primary molars that were treated using either the Hall technique (HT) or the Conventional technique (CT). The studies' meta-analyses compared HT and CT outcomes quantified as odds ratio, risk ratio, success, failure, or survival rate. The analyses included healthy children without special needs.

Articles that were unpublished or not designed as systematic reviews or meta-analyses were excluded from the review. Reviews that analyzed primary carious molars with incipient enamel lesions, symptomatic molars, or molars with the diagnosis of irreversible pulpitis or necrotic were also excluded. A total of 3 reviews met the inclusion criteria.

Using AMSTAR 2 to assess quality appraisal, risk of bias, heterogeneity of the data, and certainty of evidence (COE) we found all three studies to have scores of low qualities. A high degree of overlap in the primary studies supports the idea that further research is needed on this topic.

For the meta-analysis summary, the author names, year of publication, number and study design of the primary study, and outcome metrics were collected.

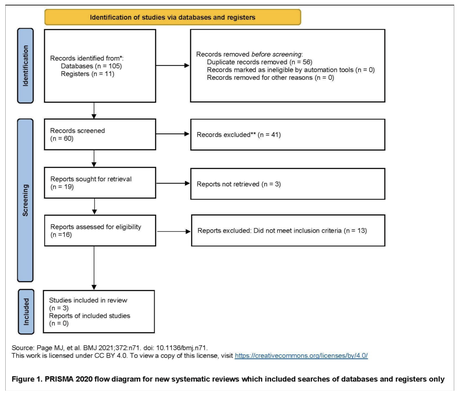
PURPOSE

The study aims to compare the success and survival rate for stainless steel crown restorations on primary molars placed by the Hall and Conventional Techniques.

The inclusion criteria were defined as: 1) major failure (irreversible pulpitis, abscess, require extraction) and 2) minor failure (loss, caries progression).

FIGURES

Figure 1: Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram of identification and selection of included reviews.



Source: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.
This work is licensed under CC BY 4.0. To view a copy of this license, visit https://creativecommons.org/licenses/by/4.0/

Figure 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only

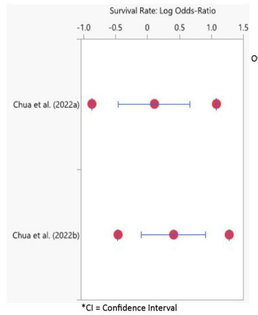
Figure 2_AMSTAR 2_HT vs CT

AMSTAR 2 domain items	Badar et al. (2019)	Chua et al. (2022)	Hu et al. (2022)
1. Did the research questions and inclusion criteria for the review include the components of PICO?			
2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?			
3. Did the review authors explain their selection of the study designs for inclusion in the review?			
4. Did the review authors use a comprehensive literature search strategy?			
5. Did the review authors perform study selection in duplicate?			
6. Did the review authors perform data extraction in duplicate?			
7. Did the review authors provide a list of excluded studies and justify the exclusions?			
8. Did the review authors describe the included studies in adequate detail?			
9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual non-randomized studies of interventions (NRSI) studies that were included in the review?			
10. Did the review authors report on the sources of funding for the studies included in the review?			
11. If meta-analysis was performed, did the review authors use appropriate methods for statistical combination of non-randomized studies of interventions (NRSI) results?			
12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?			
13. Did the review authors account for RoB in primary studies when interpreting/discussing the results of the review?			
14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?			
15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?			
16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?			
Number of negatively answered critical domains (item #s 2,4,7,9,11,13,15)	1	1	1
Final Rating	Low	Low	Low

Color Code:
= no
= partial yes
= yes

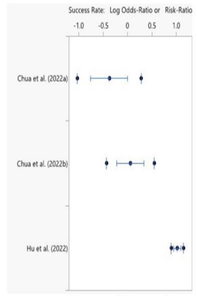
Footnotes:
Final Rating Assessments:
High: 0-1 noncritical weakness.
Moderate: >1 noncritical weakness. The systematic review has more than one weakness, but no critical flaws.
Low: 1 critical flaw with or without noncritical weaknesses.
Critically low: >1 critical flaw with or without noncritical weaknesses.

Figure 3. Forest Plot and Tables



	Overall Effect	95% *CI Lower Limit	95% *CI Upper Limit
Chua et al. (2022a)	0.11	-0.87	1.08
Chua et al. (2022b)	0.41	-.046	1.28

*CI = Confidence Interval



	Overall Effect	95% *CI Lower Limit	95% *CI Upper Limit	Metric
Chua et al. (2022a)	-0.37	-1.03	0.28	Log Odds-Ratio
Chua et al. (2022b)	0.06	-0.43	0.55	Log Odds-Ratio
Hu et al. (2022)	1.02	0.90	1.15	Risk Ratio

* CI = Confidence Interval

RESULTS

- Three studies met the inclusion criteria, and a meta-analysis was conducted for each of the three studies (Figure 1).[4-6]
- No significant differences were found between the success rates of HT and CT (Figure 3).
- No significant differences were found when assessing survival rates between HT and CT (Figure 3).
- Using AMSTAR 2 to assess quality appraisal, risk of bias, heterogeneity of the data, and certainty of evidence (COE) all three studies were found to have scores of low quality due to inadequate investigation of publication bias and lack of discussion on its potential impact on the review results (Figure 2).

CONCLUSIONS

Dentist should consider preference toward the HT over CT for management of caries in primary molars due to its minimally invasive process compared to CT.

REFERENCES

1. Oral health: prevention is key. Lancet. 2009;373(9657):1. doi:10.1016/S0140-6736(08)61933-9
2. Lockerman LZ. Is the traditional placement of stainless steel crowns in primary teeth more painful than the non-preparation Hall technique?. Evid Based Dent. 2023;24(3):108-109. doi:10.1038/s41432-023-00906-3
3. BaniHani A, Santamaría RM, Hu S, Maden M, Albadri S. Minimal intervention dentistry for managing carious lesions into dentine in primary teeth: an umbrella review. Eur Arch Paediatr Dent. 2022;23(5):667-693. doi:10.1007/s40368-021-00675-6
4. Badar SB, Tabassum S, Khan FR, Ghafoor R. Effectiveness of Hall Technique for Primary Carious Molars: A Systematic Review and Meta-analysis. Int J Clin Pediatr Dent. 2019;12(5):445-452. doi:10.5005/jp-journals-10005-1666
5. Chua DR, Tan BL, Nazzal H, Srinivasan N, Duggal MS, Tong HJ. Outcomes of preformed metal crowns placed with the conventional and Hall techniques: A systematic review and meta-analysis. Int J Paediatr Dent. 2023;33(2):141-157. doi:10.1111/ipd.13029
6. Hu S, BaniHani A, Nevitt S, Maden M, Santamaria RM, Albadri S. Hall technique for primary teeth: A systematic review and meta-analysis. Jpn Dent Sci Rev. 2022;58:286-297. doi:10.1016/j.jdsr.2022.09.003

Funding by NYU Langone Hospitals, Hansjorg Wyss Department of Plastic Surgery