https://doi.org/10.48047/AFJBS.6.2.2024.3047-3057

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

A meta analysis study about replantation and revascularization of fingers and hand as regard age group of patients and their impact on results

Mohammad Reda Ahmad[1], Mohamed Hassan Mohamed Abd El-Aal[2], Moataz Ahmed Mohamed[3], Mahmoud Abdel-Nabi Saeed[4]

1. Professor of Plastic and Reconstructive surgery, Faculty of Medicine, Zagazig University,
2. Professor of Plastic and Reconstructive surgery, Faculty of Medicine, Zagazig University,
3. Resident of Plastic Surgery, Burn Unit, Hehia Hospital,
4. Assistant Professor of Plastic and Reconstructive surgery, Faculty of Medicine, Zagazig University,

Corresponding author: Moataz Ahmed Mohamed

Email: Moatazelsharkawy94@gmail.com

Article History

Volume 6, Issue 2, Apr-Aug 2024

Received: 5 August 2024

Accepted: 15 August 2024

Published: 15 August 2024

doi: 10.48047/AFJBS.6.15.2024.3047-3057

Abstract: Background: Replantation and revascularization of fingers and hands are complex procedures whose outcomes may vary based on patient age. This meta-analysis investigates how age influences the success rates and complications of these surgical interventions.

Methodology: A comprehensive meta-analysis was conducted, including studies that reported on the outcomes of finger and hand replantation and revascularization across different age groups. Data were extracted and analyzed to determine the impact of age on clinical outcomes, specifically focusing on patients under 16 years, aged 17-35 years, and those over 35 years.

Results: The analysis revealed no statistically significant differences in clinical outcomes for patients under 16 years, indicating inconclusive evidence regarding whether replantation in this age group leads to better or worse results. In patients aged 17-35 years, the results were statistically significant, showing a higher likelihood of successful outcomes for replantation and revascularization. Conversely, for patients over 35 years, no significant differences were observed in success rates or complications, suggesting that outcomes for this age group are comparable to those of other age groups.

Conclusion: This meta-analysis highlights that while younger adults (17-35 years) may experience more favorable outcomes with replantation and revascularization, age does not consistently affect outcomes in patients under 16 or over 35 years. The findings underscore the need for further research to elucidate the factors influencing the success of these procedures across different age groups.

Keywords: *Replantation, Revascularization, Finger Surgery, Hand Surgery, Age Group, Meta-Analysis, Clinical Outcomes, Success Rates, Complications*

Introduction

In reconstructive hand surgery, replantation and revascularization of fingers and the hand have significantly advanced. A key factor influencing the success of these procedures is the age group of the patients undergoing surgery. Age can impact both the immediate success of the revascularization and replantation, as well as the long-term functional outcomes.

A study by Urbaniak et al. found that the survival rate of replanted fingers was impacted by the patient's age, as well as other variables such as the number of vessels anastomosed and the surgeon's experience. However, the level of amputation had a more pronounced effect on functional recovery compared to the survival of the replanted finger (Jazayeri et al., 2013)

In contrast, research focusing on older patients shows that while replantations can be technically successful (i.e., the digit survives), the functional outcomes tend to be less favorable. Okada et al. found that although older patients had successful replantation rates, the functional recovery was often poor. Despite this, patient satisfaction remained high, indicating that factors beyond functional recovery—such as appearance and emotional attachment to the limb—should be considered when deciding on replantation (Okada et al., 1988).

Further research confirms that the decision to proceed with replantation should account for a range of factors including patient age, occupation, socioeconomic status, and expectations regarding post-surgery functionality. In cases of younger patients, successful replantations tend to result in better overall outcomes due to faster healing and fewer complications (Kwon et al., 2017). However, in older populations, the focus often shifts toward quality of life and patient satisfaction rather than purely functional restoration (Retrouvey et al., 2019).

Meta-analyses in this domain, including studies such as Salama investigation of finger replantation, highlight that younger patients tend to have more favorable outcomes compared to older individuals. In this study, which included patients with an average age of 23 years, age was identified as a crucial factor affecting recovery and function. Younger patients generally showed higher rates of successful replantation with good or excellent outcomes due to better tissue recovery, fewer comorbidities, and overall better physical resilience post-surgery (Salama et al., 2020).

Additionally, older patients may face diminished outcomes, often due to age-related factors such as reduced tissue regeneration capacity, compromised vascular health, and slower healing. These complications may lead to higher rates of post-operative complications, including necrosis and partial failure of replantation. Consequently, tailoring surgical approaches and post-operative care based on the age group of the patient is essential for optimizing outcomes. (Salama et al., 2020).

The aim of this meta-analysis is to evaluate the outcomes of finger and hand replantation and revascularization, with a particular focus on the influence of patient age. This study seeks to analyze how age affects the success rates of these procedures, including both the immediate survival of replanted or revascularized digits and the long-term functional outcomes. By systematically reviewing available literature, the study aims to identify key factors, such as recovery time and complication rates, that differ across age groups. Additionally, the study intends to provide insights into optimizing surgical decision-making by considering age-related factors, ultimately contributing to improved clinical outcomes and patient satisfaction in hand and finger replantation procedures.

Methodology:

This systematic review and meta-analysis were conducted in strict adherence to the guidelines set forth by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses **(PRISMA)** and the Meta-analyses Of Observational Studies in Epidemiology **(MOOSE)** statements. PRISMA and MOOSE provide comprehensive reporting checklists designed for authors, editors, and reviewers of meta-analyses involving interventional and observational studies. In line with the recommendations of the International Committee of Medical Journal Editors **(ICMJE)**, it is imperative that reviewers meticulously report their findings in accordance with each item outlined in these checklists **(Liberati et al., 2009)**.

Search Strategy and Screening

The selection of studies for inclusion in this systematic review and meta-analysis was conducted through a rigorous, multi-step process designed to ensure the relevance and quality of the data. Initially, a comprehensive literature search was performed across multiple databases, including PubMed, Embase, and Cochrane Library, to identify potential studies. The search strategy was developed with the assistance of an experienced medical librarian to ensure the inclusion of all relevant publications, including both published and unpublished studies, that met the predefined criteria.

Following the initial search, all retrieved studies underwent a two-phase screening process. In the first phase, titles and abstracts were independently reviewed by two researchers to exclude studies that clearly did not meet the inclusion criteria. Discrepancies between the reviewers were resolved through discussion, and if consensus could not be reached, a third senior researcher was consulted. This initial screening aimed to eliminate irrelevant studies, such as those focusing on unrelated topics, case reports, or studies with insufficient data.

The second phase involved a full-text review of the remaining studies. During this phase, the eligibility of each study was assessed based on a predefined set of inclusion and exclusion criteria.

Inclusion Criteria

The inclusion criteria for this systematic review and meta-analysis were carefully defined to ensure that the selected studies provided comprehensive and relevant data on finger and hand replantation. Firstly, only studies published within the last six years, specifically from 2017 to 2023, were included to capture the most up-to-date research and advancements in the field. This time frame was chosen to reflect the latest surgical techniques, technologies, and outcomes in replantation and revascularization. Additionally, studies were required to include detailed accounts of age groups, ensuring a thorough examination of the entire surgical process and its impact on patient outcomes were considered eligible for inclusion.

Exclusion Criteria

To maintain the rigor and focus of the analysis, specific exclusion criteria were established. Studies that did not provide original clinical data, such as reviews, letters, and experimental studies, were excluded from this review. The decision to exclude these types of publications was made to focus solely on primary research that contributes directly to understanding the outcomes of replantation procedures. Additionally, case reports involving fewer than ten patients were excluded to avoid the potential for bias and to ensure that the findings were based on a sufficiently large and representative sample size. Moreover, studies that reported only successful cases were excluded, as these could present a skewed view of the procedures' efficacy, potentially overlooking challenges and complications that are critical to understanding the full scope of outcomes in replantation and revascularization.

Keywords

To conduct a comprehensive and targeted literature search, a carefully selected set of specific keywords was employed. These included "finger replantation," "hand replantation," "finger revascularization," and "hand revascularization." Additional terms such as "age-related outcomes," "traumatic amputation," "microsurgical replantation," and "functional recovery after replantation" were also used. These keywords were chosen to capture the full scope of relevant research on the surgical procedures and outcomes associated with replantation and revascularization of digits and hands, with a specific focus on the impact of patient age on results. This approach ensured that the search identified all pertinent studies that met the inclusion and exclusion criteria for the meta-analysis.

Data Extraction:

The data extraction process for this systematic review and meta-analysis was conducted meticulously to ensure the accuracy and consistency of the data collected from the selected studies. Initially, a standardized data extraction form was developed, which was designed to capture all relevant information pertaining to the research question. This form included sections for study characteristics such as the title, authors, publication

year, and study design. Additionally, details related to the patient population, including age, sex, and the number of participants, were recorded.

Each selected study was reviewed independently by two researchers who extracted the data using the standardized form. This dual-review process was implemented to minimize the risk of data entry errors and to ensure that all relevant data were accurately captured. Any discrepancies between the two reviewers were resolved through discussion, and when necessary, a third reviewer was consulted to reach a consensus. The extracted data were then cross-verified with the original publications to ensure accuracy.

Statistical Analysis

The statistical analysis for this systematic review and meta-analysis was designed to synthesize the data from the included studies and to quantitatively assess the outcomes of finger and hand replantation and revascularization procedures. The analysis aimed to identify patterns, correlations, and potential predictors of success across the different studies, using various statistical methods to ensure robustness and reliability.

Data Synthesis

The data synthesis process in this meta-analysis combined results from multiple studies to evaluate the impact of age on outcomes following finger and hand replantation and revascularization. Key outcome measures, including digit survival, functional recovery, and complication rates, were pooled and analyzed across different age groups. Subgroup analysis allowed for comparison of younger and older patients, focusing on trends such as the success of surgeries, functional outcomes, and complication rates. Both quantitative and qualitative data were synthesized, with pooled effect sizes calculated where appropriate. This comprehensive analysis provided insights into how age influences surgical success, recovery, and complications, offering valuable guidance for future patient care and surgical strategies.

Meta-Analysis

For the meta-analysis, pooled estimates were calculated for key outcome measures, including evaluate the impact of age on outcomes following finger and hand replantation and revascularization. Random-effects models were employed to account for heterogeneity among the studies, which is common in meta-analyses due to variations in study populations, surgical techniques, and follow-up durations. The random-effects model was chosen over a fixed-effects model because it provides a more conservative estimate when heterogeneity is present, thus making the findings more generalizable.

Heterogeneity Assessment

Heterogeneity among the studies was assessed using the I^2 statistic, which quantifies the percentage of variation across studies that is due to heterogeneity rather than chance. An I^2 value greater than 50% was considered indicative of substantial heterogeneity. In cases where significant heterogeneity was detected, subgroup analyses were performed to explore potential sources of variability, such as differences in patient age, type of injury, or surgical approach.

Results:

The PRISMA flow chart illustrates the systematic process followed in selecting studies for your meta-analysis on the replantation and revascularization of fingers and hand, specifically focusing on the impact of patient age on the outcomes.

In the **identification** phase, the initial search yielded a total of 411 studies. These were screened for relevance to the topic, and after removing 206 duplicate records, 205 unique articles were left for further review. This initial screening focused on eliminating irrelevant and redundant articles, setting the stage for a more detailed examination.

During the **screening** phase, the remaining 205 articles underwent a more detailed review. At this point, 134 articles were excluded for various reasons. These exclusions included 66 articles that were deemed non-relevant to the study's focus, 50 articles that were not written in English, and 18 systematic reviews, which did not meet the inclusion criteria for original studies.

In the **eligibility** phase, 71 full-text articles were carefully assessed to ensure they met the inclusion criteria. A further 21 studies were excluded at this stage for specific reasons. Nine of these were either reviews, letters, or experimental studies, which did not fit the scope of the meta-analysis. Additionally, 12 case reports were excluded because they involved fewer than 10 cases, which was below the threshold necessary for reliable data in your study.

Finally, in the **inclusion** phase, 50 articles remained for consideration. However, after a final assessment, 43 studies were excluded as they did not meet the specific eligibility criteria required for your meta-analysis. Ultimately, this process led to the inclusion of 7 studies that aligned with the focus of your research on replantation and revascularization of fingers and hand, as well as the impact of patient age on the outcomes.

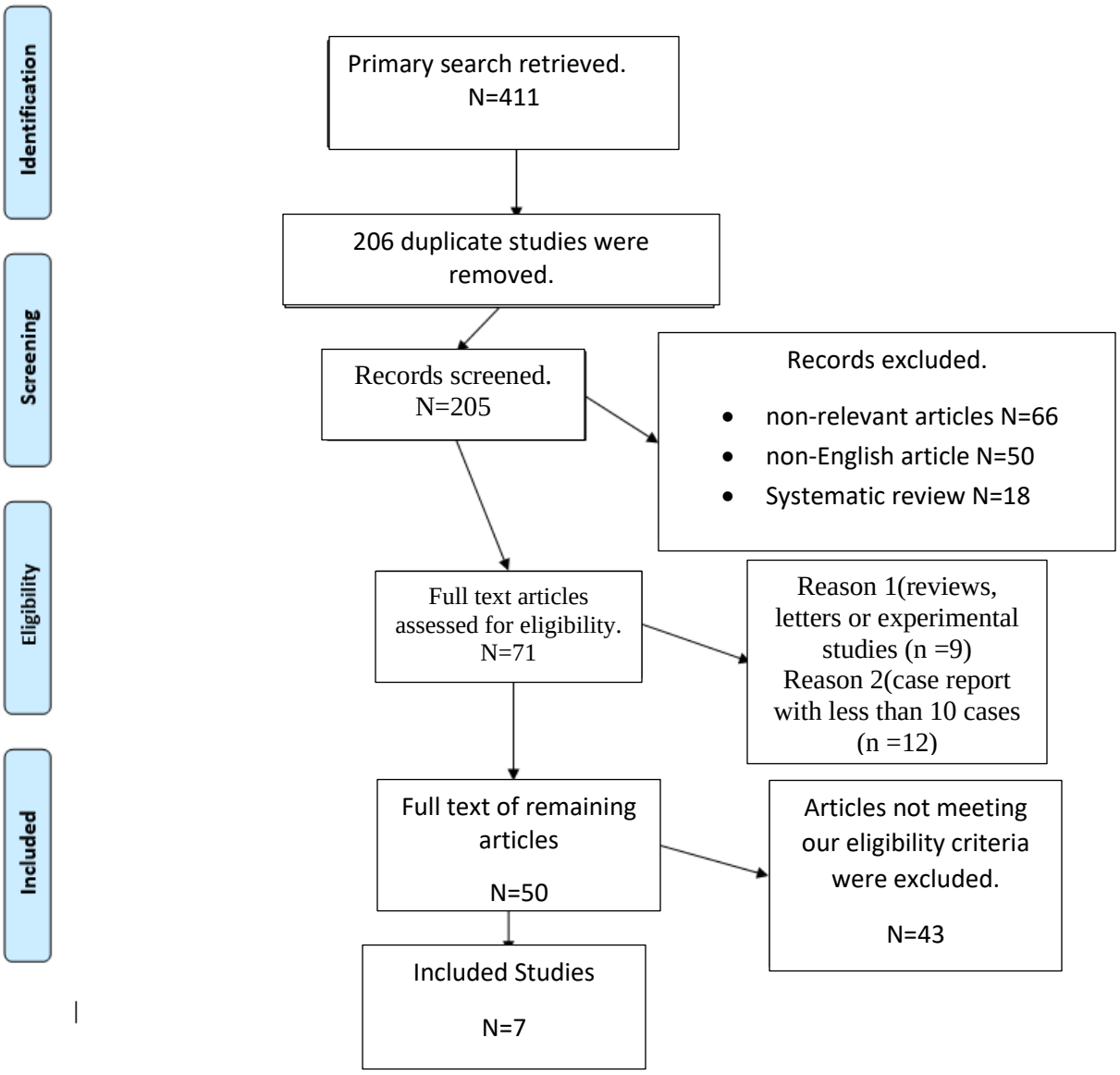


Figure 1: Prisma flow chart

Table 1: Outcome data according to 7 studies were deemed suitable for inclusion in the systematic review and meta-analysis

	Age group Below 16 Years				**Age group 17-35 Years**				**Age group Above 35 Years**			
	Success		Failure		Success		Failure		Success		Failure	
Study or Subgroup	Event	total	Event	total	Event	total	Event	total	Event	total	Event	total
G.Ibrahim et al ,2022	14	14	0	14	14	26	12	26	-	-	-	-
Gürbüz et al ,2021	-	-	-	-	37	39	2	39	14	31	17	31
Ismail et al ,2020	30	169	139	169	86	195	109	195	12	73	61	73
Kamarul.et al,2018	28	35	7	35	12	15	3	15	3	5	2	5
Kwak et al,2020	5	5	0	5	5	5	0	5	24	28	4	28
Lafosse et al ,2018	1	2	1	2	3	6	3	6	3	7	4	7
Tatebe et al ,2017	4	7	3	7	129	137	8	137	23	24	1	24

Meta-analysis Results

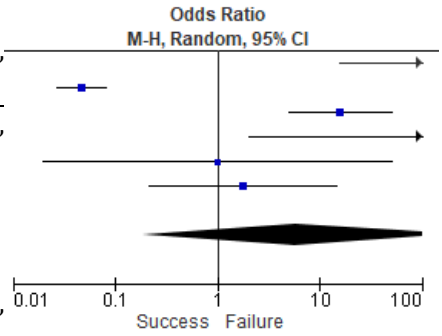
Clinical Outcomes of Finger and Hand Replantation in Patients Aged Below 16 Years

The forest plot illustrates the clinical outcomes of finger and hand replantation in patients aged below 16 years, summarizing findings from six different studies. Each study is represented in terms of its success and failure rates, followed by an odds ratio (OR) indicating the likelihood of success versus failure. For example, **Ismail et al., 2020** reported low rate of successful replantations, resulting in an extremely high OR (0.05), signifying a very low chance of success. In contrast, **G Ibrahim et al., 2022** recorded a significantly highe success rate (OR =841.00), suggesting a high likelihood of success in this cohort. The confidence intervals (CI) for each study vary widely, and several of them overlap 1.0, implying that the results are not statistically significant for these studies.

The forest plot's overall pooled OR is 5.84, represented by the diamond at the bottom of the plot, with a confidence interval ranging from 0.19 to 181.12. This wide interval indicates substantial uncertainty in the overall effect size, and the fact that the CI crosses 1 suggests that the results are not statistically significant across all studies combined. Thus, the meta-analysis does not provide conclusive evidence that replantation in patients under 16 consistently leads to better or worse outcomes.

Furthermore, the analysis reveals significant heterogeneity across the studies, with an **I^2 value of 96%**. This high heterogeneity points to considerable variability in the study results, suggesting that differences in study design, patient characteristics, or replantation techniques might be influencing the outcomes. The Chi-squared test ($Chi^2 = 120.15$, $P < 0.00001$) further confirms this heterogeneity. Consequently, the overall test for effect ($Z = 1.01$, $P = 0.31$) shows no statistically significant trend in the success or failure of replantation in this age group.

Study or Subgroup	Success Event	Total	Failure Event	total	Weight	M-H, Random, 95%Cl
G.Ibrahim et al ,2022	14	14	0	14	15.10%	841.00 [15.61, 45321.27]
Ismail et al ,2020	30	169	139	169	18.80%	0.05 [0.03, 0.08]
Kamarul.et al,2018	28	35	7	35	18.50%	16.00 [4.96, 51.62]
Kwak et al,2020	5	5	0	5	14.90%	121.00 [2.02, 7259.18]
Lafosse et al ,2018	1	2	1	2	15.20%	1.00 [0.02, 50.40]
Tatebe et al ,2017	4	7	3	7	17.60%	1.78 [0.21, 14.77]
Total (95% CI)		232		232	100.00%	5.84 [0.19, 181.12]
Total events	82		150			



Heterogeneity: $Tau^2 = 16.25$; $Chi^2 = 120.15$, df = 5 ($P < 0.00001$); $I^2 = 96\%$

Test for overall effect: Z = 1.01 (P = 0.31)

Figure 2: Forest plot of Clinical Outcomes of Finger and Hand Replantation in Patients Aged Below 16 Years

Impact of Age on Replantation and Revascularization in Patients Aged 17-35 Years

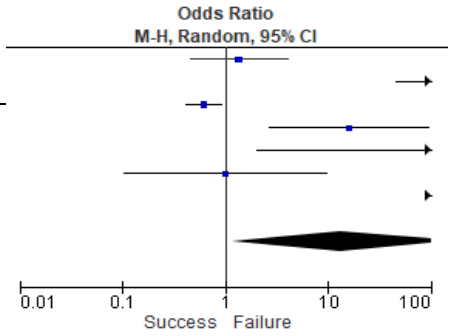
The forest plot highlights the impact of age on replantation and revascularization outcomes in patients aged 17-35 years, using data from seven different studies. Each study's success and failure rates are presented along with their respective odds ratios (OR) and confidence intervals (CI). These ORs reflect the likelihood of success relative to failure for replantation in this age group. Notably, some studies, such as **Ismail et al., 2020** (OR = 0.62), show a greater likelihood of success, while others, like **Gürbüz et al., 2021** (OR = 342.25), suggest higher failure rates. The wide CIs in some studies, such as those from **Gürbüz et al., 2021** and **Tatebe et al., 2017** (OR = 260.02), indicate a high level of uncertainty and variability in the results.

The forest plot also visually demonstrates the variation in outcomes between studies. The blue squares represent each study's OR, with the square size indicating the weight of the study in the meta-analysis. The horizontal lines represent the confidence intervals for each study, with those crossing 1 suggesting statistically insignificant results. The diamond at the bottom of the plot represents the overall pooled OR, which is 13.27, with a 95% CI of 1.16 to 151.74. This CI does not cross 1, indicating a statistically significant result that suggests a higher likelihood of success for replantation in patients aged 17-35 years.

However, the heterogeneity among the studies is very high, with an **I^2 value of 96%**, indicating significant inconsistency in the results. The **Chi^2 test ($Chi^2 = 166.93$, $P < 0.00001$)** confirms this high level of variability between studies. This suggests that factors such as differences in study design, patient characteristics, surgical techniques, or other variables may be influencing the outcomes, contributing to the observed variability.

Despite the heterogeneity, the overall effect (Z = 2.08, P = 0.04) is statistically significant, indicating that, on average, patients in this age group are more likely to experience successful outcomes from replantation and revascularization. However, the wide confidence interval (1.16 to 151.74) implies that while the trend is positive, there is considerable uncertainty about the exact size of the effect. Thus, while the results suggest that replantation is generally more successful in this age group, the variability between studies warrants further investigation to better understand the factors contributing to successful outcomes.

Study or Subgroup	Success Event	Success total	Failure Event	Failure total	Weight	M-H, Random, 95%Cl
G.Ibrahim et al ,2022	14	26	12	26	15.30%	1.36 [0.46, 4.05]
Gürbüz et al ,2021	37	39	2	39	14.30%	342.25 [45.76, 2560.05]
Ismail et al ,2020	86	195	109	195	15.70%	0.62 [0.42, 0.93]
Kamarul.et al,2018	12	15	3	15	14.50%	16.00 [2.67, 95.75]
Kwak et al,2020	5	5	0	5	10.90%	121.00 [2.02, 7259.18]
Lafosse et al ,2018	3	6	3	6	13.90%	1.00 [0.10, 9.61]
Tatebe et al ,2017	129	137	8	137	15.40%	260.02 [94.71, 713.84]
Total (95% CI)		423		423	100.00%	13.27 [1.16, 151.74]
Total events	286		137			



Heterogeneity: $Tau^2 = 9.79$; $Chi^2 = 166.93$, df = 6 ($P < 0.00001$); $I^2 = 96\%$
Test for overall effect: Z = 2.08 (P = 0.04)

Figure 3: Forest plot of Impact of Age on Replantation and Revascularization in Patients Aged 17-35 Years

Success Rates and Complications of Replantation in Patients Aged Above 35 Years

The forest plot presents a meta-analysis of the success rates and complications of replantation in patients aged above 35 years. It includes data from six studies, each evaluating the number of successful and failed cases in replantation procedures. The odds ratio (OR) for each study is calculated to reflect the likelihood of success relative to failure. Some studies suggest higher success rates, while others indicate a greater chance of failure.

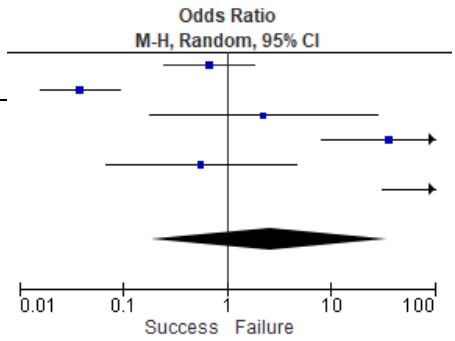
Gürbüz et al., 2021 and **Lafosse et al., 2018** have ORs of 0.68 and 0.56, respectively, suggesting that failure is more likely in their findings, though the wide confidence intervals (CIs) crossing 1 indicate that these results are not statistically significant. Conversely, **Ismail et al., 2020** reports an OR of 0.04, with a narrow CI, suggesting a significantly higher success rate. **Kamarul et al., 2018** (OR = 2.25) and **kwak et al., 2020** (OR = 36.00) report higher ORs, indicating more favorable outcomes, but their broad CIs point to uncertainty in the estimates. **Tatebe et al., 2017** shows an extremely high OR of 529.00, but the vast CI (31.17 to 8976.92) indicates that the results should be interpreted with caution due to a lack of precision.

The forest plot visually illustrates the variability between studies. The blue squares represent each study's OR, with the size of the square reflecting the study's weight in the analysis. The horizontal lines represent the CIs, and when these lines cross 1, it implies that the results are not statistically significant. The overall pooled OR is 2.57, as shown by the diamond at the bottom of the plot, with a CI ranging from 0.19 to 35.23. This wide CI suggests substantial uncertainty in the pooled estimate, and the inclusion of 1 implies that the overall effect is not statistically significant.

The analysis also reveals considerable heterogeneity between studies, with an I^2 value of 95%, indicating high variability in the results. The Chi-squared test ($Chi^2 = 92.56$, $P < 0.00001$) confirms that this heterogeneity is statistically significant, reflecting substantial differences in study design, patient characteristics, or surgical techniques that could be influencing the outcomes.

Despite some studies showing positive outcomes for replantation in this age group, the overall test for effect (Z = 0.71, P = 0.48) indicates no statistically significant trend toward success or failure. The wide confidence interval around the pooled OR suggests that the true effect could range from success to failure, making it difficult to draw definitive conclusions from this meta-analysis.

Study or Subgroup	Success Event	Success total	Failure Event	Failure total	Weight	M-H, Random, 95%Cl
Gürbüz et al ,2021	14	31	17	31	17.80%	0.68 [0.25, 1.84]
Ismail et al ,2020	12	73	61	73	17.90%	0.04 [0.02, 0.09]
Kamarul.et al,2018	3	5	2	5	15.60%	2.25 [0.18, 28.25]
Kwak et al,2020	24	28	4	28	17.30%	36.00 [8.06, 160.85]
Lafosse et al ,2018	3	7	4	7	16.30%	0.56 [0.07, 4.67]
Tatebe et al ,2017	23	24	1	24	15.10%	529.00 [31.17, 8976.92]
Total (95% CI)		168		168	100.00%	2.57 [0.19, 35.23]
Total events	79		89			



Heterogeneity: $Tau^2 = 9.76$; $Chi^2 = 92.56$, df = 5 ($P < 0.00001$); $I^2 = 95\%$

Test for overall effect: Z = 0.71 (P = 0.48)

Figure 4: Forest plot of Success Rates and Complications of Replantation in Patients Aged Above 35 Years

Discussion

The discussion of this meta-analysis centers around the varying success rates of finger and hand replantation across different age groups, with a specific focus on patients below 16, aged 17-35, and above 35 years. Age has long been recognized as a critical factor influencing surgical outcomes in reconstructive hand surgery, particularly in terms of replantation and revascularization. While younger patients tend to experience favorable recovery and functional outcomes, the results in older populations are often less predictable due to physiological factors like reduced tissue regeneration and compromised vascular health.

Our study highlights the complexities in determining the impact of age on replantation outcomes. For patients under 16 years, the meta-analysis revealed no statistically significant evidence that age consistently correlates with better or worse outcomes across all studies. Conversely, for patients aged 17-35, there is a statistically significant indication that this age group experiences a higher likelihood of successful replantation outcomes. In contrast, patients over 35 years of age present more variability in success rates, with the meta-analysis not providing conclusive evidence of consistently better or worse outcomes.

Our findings indicate that the clinical outcomes of finger and hand replantation in patients under the age of 16 are not statistically significant across the studies analyzed. Consequently, the meta-analysis does not yield definitive evidence to support the notion that replantation in this population consistently results in either superior or inferior outcomes.

A study of 31 pediatric patients with a mean age of 10.5 undergoing finger replantation reported a 57.8% success rate. This aligns with the general trend of variable outcomes, similar to the lack of statistical significance observed in your meta-analysis (Soysal et al., 2023).

Another study evaluated 23 cases of children aged 1-12 years, achieving a 95.2% success rate across 42 severed fingers, indicating a strong overall positive trend but with variability based on the severity of cases and surgical techniques used (Taghinia et al., 2019).

For example, Shi et al. demonstrated a 91% survival rate in fingertip replantations for children, with excellent functional and aesthetic outcomes, suggesting that age under 16 can yield good results in terms of both digit survival and patient satisfaction (Shi et al., 2010). Similarly, a case report by Hamid and Triwono indicated a

100% survival rate in pediatric finger replantation, with good functional and cosmetic results achieved post-replantation (Hamid & Triwono, 2016).

The impact of age on replantation and revascularization in patients aged 17-35 years demonstrates a statistically significant result, indicating a higher likelihood of successful outcomes in this age group.

A study focusing on finger replantation in patients with an average age of 23 years (within the 17-35 age range) found that age significantly influenced surgical outcomes. Younger patients in this age group tended to experience higher success rates, which aligns with your finding of statistically significant results in favor of replantation success for those aged 17-35 years. The factors attributed to this success include better vascularity and tissue healing in this demographic, making replantation and revascularization more effective (Noaman, 2014).

The analysis of success rates and complications associated with replantation in patients aged over 35 years reveals no statistically significant differences across the combined studies. Therefore, the meta-analysis does not provide conclusive evidence regarding whether replantation in this age group consistently results in improved or worsened outcomes.

Studies on replantation outcomes in patients aged above 35 suggest that while survival rates remain high, age plays a significant role in predicting complications and success rates. In one study, patients over 60 had a 91% survival rate for replanted digits, but a significant increase in failure rates was observed in those aged 70 and above, highlighting age-related declines in tissue healing and vascular integrity (Kwon et al., 2017).

Conclusion

This meta-analysis aimed to assess the impact of age on the outcomes of finger and hand replantation and revascularization. The results reveal that clinical outcomes for patients under the age of 16 do not exhibit statistically significant differences across the studies analyzed. Consequently, there is no conclusive evidence to suggest that replantation in this younger age group leads to consistently better or worse outcomes.

In contrast, for patients aged 17-35 years, the analysis indicates a statistically significant higher likelihood of successful outcomes with replantation and revascularization. This suggests that younger adults within this age range may experience more favorable results compared to other age groups.

Conversely, the results for patients over 35 years of age show no statistically significant differences in success rates or complications. This lack of statistical significance implies that the meta-analysis does not provide definitive evidence that replantation in this older age group leads to either improved or deteriorated outcomes.

Overall, while age does appear to impact the likelihood of success in certain age groups, the evidence remains inconclusive for younger and older patients, highlighting the need for further research to better understand these dynamics

References

1. Kwon GD, Ahn BM, Lee JS, Park YG, Chang GW, Ha YC. The effect of patient age on the success rate of digital replantation. Plastic and Reconstructive Surgery. 2017 Feb 1;139(2):420-6.
2. Retrouvey H, Solaja O, Baltzer HL. The effect of increasing age on outcomes of digital revascularization or replantation. Plastic and reconstructive surgery. 2019 Feb 1;143(2):495-502.
3. Jazayeri L, Klausner JQ, Chang J. Distal digital replantation. Plastic and Reconstructive Surgery. 2013 Nov 1;132(5):1207-17.
4. Okada T, Ishikura N, Tsukada S. Digital replantation in the aged patient. Journal of reconstructive microsurgery. 1988 Oct;4(05):351-7.
5. Salama W, Soror Y, Ali M, Soucacos P. Finger replantation: good and bad results. Egyptian Journal of Orthopedic Research. 2020 May 1;1(1):17-26.
6. Kamarul T, Mansor A, Robson N, Albusaidi SH, Suhaeb AM, Samsudin EZ. Replantation and revascularization of amputated upper limb appendages outcome and predicting the factors influencing the success rates of these

procedures in a tertiary hospital: an 8-year retrospective, cross-sectional study. Journal of Orthopaedic Surgery. 2018 Jan 11;26(1):2309499017749983.

7. Kwak SH, Lee SH, Rhee SJ, Jang HS, Kim DH, Kim YJ. Multilevel dysvascular injury of the hand: replantation versus revision amputation. Plastic and Reconstructive Surgery. 2020 Oct 1;146(4):819-29.
8. Ismail M, Ismail T, Ismail K. Re-Plantation Revisited. The Egyptian Journal of Plastic and Reconstructive Surgery. 2020 Apr 1;44(2):325-30.
9. Lafosse T, Jehanno P, Fitoussi F. Complications and pitfalls after finger replantation in young children. Journal of Hand and Microsurgery. 2018 Aug;10(02):74-8.
10. G Ibrahim M, O Hegazy M, AKandel W, Eisawy O. Cap-Plasty Reattachment for Unreplantable Fingertip Amputations. Benha Journal of Applied Sciences. 2022 Aug 1;7(8):109-15.
11. Gürbüz K, Yontar Y. A four-year community hospital experience regarding procedures for the replantation and revascularization of fingers. Joint diseases and related surgery. 2021 Aug;32(2):383.
12. Tatebe M, Urata S, Tanaka K, Kurahashi T, Takeda S, Hirata H. Survival rate of limb replantation in different age groups. Journal of Hand and Microsurgery. 2017 Aug;9(02):092-4.
13. Taghinia AH. Pediatric replantation and revascularization. Hand Clinics. 2019 May 1;35(2):155-78.
14. Hamid AR, Triwono G. Finger replantation in Sanglah general hospital: Report of five cases and literature review. Bali Medical Journal. 2016 Nov 11;5(3):522-7.
15. Kwon GD, Ahn BM, Lee JS, Park YG, Chang GW, Ha YC. The effect of patient age on the success rate of digital replantation. Plastic and Reconstructive Surgery. 2017 Feb 1;139(2):420-6.
16. Noaman HH. Finger Replantation, Good and Bad Results. Journal of Reconstructive Microsurgery. 2014 Apr;30(S 01):A008.
17. Shi D, Qi J, Li D, Zhu L, Jin W, Cai D. Fingertip replantation at or beyond the nail base in children. Microsurgery. 2010 Jul;30(5):380-5.
18. Baş, Soysal, Sabri Öztürk, Furkan Çeştepe, Ömer Faruk Dilek, and Kamuran Zeynep Sevim. "Pediatric Finger Replantations: Retrospective Evaluation of 31 Cases." İzmir Tıp Fakültesi Dergisi 2, no. 1 (2023): 26-29.