



CLINICAL APPLICATION AND OUTCOMES OF RECONSTRUCTIVE MICROSURGERY IN AFRICA: A SYSTEMATIC REVIEW AND META-ANALYSIS

Supplementary Digital Content

Abstract

This systematic review and meta-analysis evaluated the application and outcomes of microsurgery in Africa from 1976 to 2020. The 89% pooled free-flap success rate was comparable to reported outcomes in high income countries. However, the higher complication rate (51%) and lower salvage rate (45%) suggest need for improved perioperative care.

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CLINICAL APPLICATION AND OUTCOMES OF RECONSTRUCTIVE MICROSURGERY IN AFRICA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Appendix 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 Checklist¹

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 1
ABSTRACT			
Abstract	2	PRISMA 2020 for Abstracts checklist complete.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 4
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 4 and Appendix 3
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Appendix 3

Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 4-5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 4-5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 4-5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 4
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Page 4-5
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 4-5

	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 4-5
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 5
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Page 5
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	Page 5
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 4
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 5-6, Figure 1, Appendix 3
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Appendix 4
Study characteristics	17	Cite each included study and present its characteristics.	Appendix 5
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 5-6, Appendix 6-7

Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Page 6-8, Appendix 8-18
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 5 Appendix 6-7
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Page 6-8 Figures 3-5 Appendix 17-18
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Page 7
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Page 5-6 Appendix 16
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 5-6
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 7-8
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 8-12
	23b	Discuss any limitations of the evidence included in the review.	Page 11-12
	23c	Discuss any limitations of the review processes used.	Page 11-12
	23d	Discuss implications of the results for practice, policy, and future research.	Page 11-12

OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 12
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 12
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 12
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 1
Competing interests	26	Declare any competing interests of review authors.	Page 1
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Supplemental Digital Content

Appendix 2: Meta-analyses Of Observational Studies in Epidemiology (MOOSE) Checklist²

Reporting Criteria	Reported (Yes/No)	Reported on Page
Reporting of Background		
Problem definition	Yes	Page 3
Hypothesis statement	N/A	
Description of Study Outcome(s)	Yes	Page 4
Type of exposure or intervention used	Yes	Page 4
Type of study design used	Yes	Page 4
Study population	Yes	Page 4
Reporting of Search Strategy	Yes	Appendix 3
Qualifications of searchers (eg, librarians and investigators)	Yes	Title Page and Authors list
Search strategy, including time period included in the synthesis and keywords	Yes	Appendix 3
Effort to include all available studies, including contact with authors	Yes	Page 6
Databases and registries searched	Yes	Appendix 3
Search software used, name and version, including special features used (eg, explosion)	Yes	Page 4
Use of hand searching (eg, reference lists of obtained articles)	Yes	Page 4
List of citations located and those excluded, including justification	Yes	Appendix 4-5
Method for addressing articles published in languages other than English	Yes	Page 4
Method of handling abstracts and unpublished studies	Yes	Page 4
Description of any contact with authors	Yes	Page 4
Reporting of Methods		
Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	Yes	Page 4-5
Rationale for the selection and coding of data (eg, sound clinical principles or convenience)	Yes	Page 4-5
Documentation of how data were classified and coded (eg, multiple raters, blinding, and interrater reliability)	Yes	Page 4-5

Assessment of confounding (eg, comparability of cases and controls in studies where appropriate)	N/A	
Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results YES 5	Yes	Page 4
Assessment of heterogeneity	Yes	Page 5
Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated	Yes	Page 5
Provision of appropriate tables and graphics	Yes	Figure 2-4, Table 1-3 Supplementary Digital content
Reporting of Results		
Table giving descriptive information for each study included	Yes	Appendix 5
Results of sensitivity testing (eg, subgroup analysis)	Yes	Page 6, Appendix 16
Indication of statistical uncertainty of findings	Yes	Page 7
Reporting of Discussion		
Quantitative assessment of bias (eg, publication bias)	Yes	Page 5-6, Appendix 6
Justification for exclusion (eg, exclusion of non-English-language citations)	Yes	Appendix 4
Assessment of quality of included studies	Yes	Page 5-6, Appendix 7
Reporting of Conclusions		
Consideration of alternative explanations for observed results	Yes	Page 8-11
Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)	Yes	Page 8-11
Guidelines for future research	Yes	Page 11-12
Disclosure of funding source	Yes	Page 1

Appendix 3: Electronic Database Search

PubMed

("Surgical Flaps"[Mesh] OR "microsurgery" OR "microsurgical" OR "surgical flap" OR "surgical flaps" OR "free tissue flaps" OR "free flap" OR "free tissue flap" OR "Myocutaneous Flap" OR "myocutaneous flaps" OR "Perforator Flap" OR "perforator flaps" OR "free tissue transfer" OR "vascular anastomosis" OR "lymphatic anastomosis" OR "lymphaticovenous anastomosis" OR "neurorrhaphy" OR "nerve repair" OR "loupes" OR "operating microscope" OR "lymphaticovenular anastomosis" OR "arterial anastomosis" OR "venous anastomosis" OR "free transfer") AND ("Africa" OR "Saharan" OR "Algeria" OR "Angola" OR "Benin" OR "Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo Brazzaville" OR "Congo Kinshasa" OR "Congo" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Djibouti" OR "Egypt" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR "Guinea Bissau" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Libya" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Morocco" OR "Mozambique" OR "Namibia" OR "Niger" OR "Nigeria" OR "Rwanda" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sudan" OR "Swaziland" OR "Eswatini" OR "São Tomé and Príncipe" OR "Tanzania" OR "Togo" OR "Tunisia" OR "Uganda" OR "Western Sahara" OR "Zambia" OR "Zimbabwe")

Period Searched: Inception to 26/06/2020

Date searched: 26/06/2020, 13:20hrs CAT

Total Results: 1,421

Web of Science

TOPIC: (microsurgery OR microsurgical OR surgical flap OR surgical flaps OR free tissue flaps OR free tissue flap OR free flap OR Myocutaneous Flap OR myocutaneous flaps OR Perforator Flap OR perforator flaps OR free tissue transfer OR vascular anastomosis OR lymphatic anastomosis OR lymphaticovenous anastomosis OR loupes OR operating microscope OR lymphaticovenular anastomosis OR arterial anastomosis OR venous anastomosis OR free transfer OR neurorrhaphy OR nerve repair) AND TOPIC: (Africa OR Saharan OR Algeria OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR Cape Verde OR Central African Republic OR Chad OR Comoros OR Congo Brazzaville OR Congo Kinshasa OR Congo OR Cote d'Ivoire OR Ivory Coast OR Djibouti OR Egypt OR Equatorial Guinea OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia

OR Niger OR Nigeria OR Rwanda OR Senegal OR Seychelles OR Sierra Leone OR Somalia
OR South Africa OR South Sudan OR Sudan OR Swaziland OR Eswatini OR São Tomé and
Príncipe OR Tanzania OR Togo OR Tunisia OR Uganda OR Western Sahara OR Zambia OR
Zimbabwe

Period Searched: Inception to 26/06/2020

Date searched: 26/06/2020, 13:20hrs CAT

Total Results: 833

CINAHL

"microsurgery" OR "microsurgical" OR "surgical flap" OR "surgical flaps" OR "free tissue
flaps" OR "free flap" OR "free tissue flap" OR "Myocutaneous Flap" OR "myocutaneous flaps"
OR "Perforator Flap" OR "perforator flaps" OR "free tissue transfer" OR "vascular
anastomosis" OR "lymphatic anastomosis" OR "lymphaticovenous anastomosis" OR
"neurorrhaphy" OR "nerve repair" OR "loupes" OR "operating microscope" OR
"lymphaticovenular anastomosis" OR "arterial anastomosis" OR "venous anastomosis" OR
"free transfer" AND "Africa" OR "Saharan" OR "Algeria" OR "Angola" OR "Benin" OR
"Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central
African Republic" OR "Chad" OR "Comoros" OR "Congo Brazzaville" OR "Congo Kinshasa"
OR "Congo" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Djibouti" OR "Egypt" OR "Equatorial
Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR
"Guinea Bissau" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Libya" OR "Madagascar" OR
"Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Morocco" OR "Mozambique" OR
"Namibia" OR "Niger" OR "Nigeria" OR "Rwanda" OR "Senegal" OR "Seychelles" OR "Sierra
Leone" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sudan" OR "Swaziland" OR
"Eswatini" OR "São Tomé and Príncipe" OR "Tanzania" OR "Togo" OR "Tunisia" OR "Uganda"
OR "Western Sahara" OR "Zambia" OR "Zimbabwe"

Period Searched: Inception to 17/07/2020

Date searched: 17/07/2020, 01:50hrs CAT

Total Results: 39

MEDLINE

"microsurgery" OR "microsurgical" OR "surgical flap" OR "surgical flaps" OR "free tissue
flaps" OR "free flap" OR "free tissue flap" OR "Myocutaneous Flap" OR "myocutaneous flaps"
OR "Perforator Flap" OR "perforator flaps" OR "free tissue transfer" OR "vascular
anastomosis" OR "lymphatic anastomosis" OR "lymphaticovenous anastomosis" OR

"neurorrhaphy" OR "nerve repair" OR "loupes" OR "operating microscope" OR "lymphaticovenular anastomosis" OR "arterial anastomosis" OR "venous anastomosis" OR "free transfer" AND "Africa" OR "Saharan" OR "Algeria" OR "Angola" OR "Benin" OR "Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo Brazzaville" OR "Congo Kinshasa" OR "Congo" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Djibouti" OR "Egypt" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR "Guinea Bissau" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Libya" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Morocco" OR "Mozambique" OR "Namibia" OR "Niger" OR "Nigeria" OR "Rwanda" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sudan" OR "Swaziland" OR "Eswatini" OR "São Tomé and Príncipe" OR "Tanzania" OR "Togo" OR "Tunisia" OR "Uganda" OR "Western Sahara" OR "Zambia" OR "Zimbabwe"

Period Searched: Inception to 17/07/2020

Date searched: 17/07/2020, 01:50hrs CAT

Total Results: 1,369

EBSCO Academic Search Complete

"microsurgery" OR "microsurgical" OR "surgical flap" OR "surgical flaps" OR "free tissue flaps" OR "free flap" OR "free tissue flap" OR "Myocutaneous Flap" OR "myocutaneous flaps" OR "Perforator Flap" OR "perforator flaps" OR "free tissue transfer" OR "vascular anastomosis" OR "lymphatic anastomosis" OR "lymphaticovenous anastomosis" OR "neurorrhaphy" OR "nerve repair" OR "loupes" OR "operating microscope" OR "lymphaticovenular anastomosis" OR "arterial anastomosis" OR "venous anastomosis" OR "free transfer" AND "Africa" OR "Saharan" OR "Algeria" OR "Angola" OR "Benin" OR "Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo Brazzaville" OR "Congo Kinshasa" OR "Congo" OR "Cote d'Ivoire" OR "Ivory Coast" OR "Djibouti" OR "Egypt" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR "Guinea Bissau" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Libya" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Morocco" OR "Mozambique" OR "Namibia" OR "Niger" OR "Nigeria" OR "Rwanda" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sudan" OR "Swaziland" OR "Eswatini" OR "São Tomé and Príncipe" OR "Tanzania" OR "Togo" OR "Tunisia" OR "Uganda" OR "Western Sahara" OR "Zambia" OR "Zimbabwe"

Period Searched: Inception to 17/07/2020

Date searched: 17/07/2020, 01:50hrs CAT

Total Results: 384

Embase

(microsurgery OR microsurgical OR surgical flap OR surgical flaps OR free tissue flaps OR free tissue flap OR free flap OR Myocutaneous Flap OR myocutaneous flaps OR Perforator Flap OR perforator flaps OR free tissue transfer OR vascular anastomosis OR lymphatic anastomosis OR lymphaticovenous anastomosis OR loupes OR operating microscope OR lymphaticovenular anastomosis OR arterial anastomosis OR venous anastomosis OR free transfer OR neurorrhaphy OR nerve repair)

AND: (Africa OR Saharan OR Algeria OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR Cape Verde OR Central African Republic OR Chad OR Comoros OR Congo Brazzaville OR Congo Kinshasa OR Congo OR Cote D'Ivoire OR Ivory Coast OR Djibouti OR Egypt OR Equatorial Guinea OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR Senegal OR Seychelles OR Sierra Leone OR Somalia OR South Africa OR South Sudan OR Sudan OR Swaziland OR Eswatini OR São Tomé and Príncipe OR Tanzania OR Togo OR Tunisia OR Uganda OR Western Sahara OR Zambia OR Zimbabwe)

Period Searched: 1974 to 2020 Week 29

Date searched: 20/07/2020, 17:00hrs CAT

Total results: 279

Google Scholar

Search #1

microsurgery anastomosis OR free flap OR nerve AND africa OR saharan OR algeria OR angola OR benin OR botswana OR "burkina faso" OR burundi OR cameroon OR "cape verde" OR chad OR comoros OR congo

Search #2

microsurgery anastomosis OR free flap OR nerve AND "ivory coast" OR djibouti OR egypt OR eritrea OR ethiopia OR gabon OR gambia OR ghana OR guinea OR kenya OR lesotho OR liberia OR libya OR madagascar OR malawi

Search #3

microsurgery anastomosis OR free flap OR nerve AND mali OR mauritania OR mauritius OR morocco OR mozambique OR namibia OR niger OR nigeria OR rwanda OR senegal OR seychelles OR “sierra leone” OR somalia OR sudan

Search #4

microsurgery anastomosis OR free flap OR nerve AND swaziland OR “são tomé and príncipe” OR “south africa” OR tanzania OR togo OR tunisia OR uganda OR “western sahara” OR zambia OR Zimbabwe

Period Searched: Inception to 28/06/2020

Date searched: 28/06/2020, 09:10hrs CAT.

Method of Retrieval: The first 200 results retrieved for each search (search by relevance) were retrieved.

Total Result: 800

FINAL SEARCH RESULT

TOTAL NUMBER OF ARTICLES IDENTIFIED = **5,125**

TOTAL NUMBER AFTER REMOVAL OF DUPLICATES = **3,013**

Appendix 4: Excluded Studies

Reference	Reason for Exclusion	Comments
Abulezz, 2017 ³	Wrong Population	Japan
Accorona, 2020 ⁴	Wrong Outcome	Surgical technique article with no patient outcomes
Adams-Ray, 1992 ⁵	Wrong Population	No reconstructive microsurgery
Adekeye, 1983 ⁶	Wrong Population	No reconstructive microsurgery
Ahmed, 2008 ⁷	Wrong Population	No reconstructive microsurgery
Akiode, 2005 ⁸	Wrong Population	No reconstructive microsurgery
Al Maksoud, 2017 ⁹	Wrong Population	No reconstructive microsurgery
Aladelusi, 2018 ¹⁰	Wrong Population	No reconstructive microsurgery
Alfeky, 2018 ¹¹	Wrong Population	Unclear Population, authors contacted with no response
Alonge, 2003 ¹²	Wrong Population	No reconstructive microsurgery
Al-Refaie, 2014 ¹³	Wrong Population	No reconstructive microsurgery
Amer, 2010 ¹⁴	Duplication of patients	Amer, 2012 ¹⁵
Amer, 2020 ¹⁶	Duplication of patients	Amer, 2012 ¹⁵
Amin, 2006 ¹⁷	Wrong Population	Mixed population treated in Africa and abroad
Amole, 2017 ¹⁸	Wrong Population	No reconstructive microsurgery
Astini, 1997 ¹⁹	Wrong Population	No reconstructive microsurgery
Asuku, 2008 ²⁰	Wrong Population	No reconstructive microsurgery
Atmodiwirjo, 2013 ²¹	Wrong Population	Indonesia
Barbier, 2017 ²²	Wrong Population	No reconstructive microsurgery
Bertrand, 2019 ²³	Wrong Population	No reconstructive microsurgery
Biswas, 2015 ²⁴	Wrong Population	No reconstructive microsurgery
Carr, 1995 ²⁵	Wrong Population	Canada
Chabak, 2015 ²⁶	Wrong Population	No reconstructive microsurgery
Charpentier, 2017 ²⁷	Wrong Population	No reconstructive microsurgery
Chattar-Cora, 2007 ²⁸	Wrong Population	USA
Chekkoury-Idrissi, 1987 ²⁹	Non-English Language	French
Chidzonga, 2008 ³⁰	Duplicate Article	
Chidzonga, 2008 ³⁰	Wrong Population	No reconstructive microsurgery
Chidzonga, 2008 ³¹	Wrong Population	No reconstructive microsurgery
Classen, 2005 ³²	Wrong Population	Canada
Cronje, 1988 ³³	Wrong Population	No reconstructive microsurgery
Datli, 2020 ³⁴	Wrong Population	Turkey
de P Djientcheu, 2006 ³⁵	Wrong Population	No reconstructive microsurgery
Degiannis, 1995 ³⁶	Wrong Population	No reconstructive microsurgery
Del Bene, 1999 ³⁷	Wrong Population	Italy
Denewer, 2006 ³⁸	Wrong Population	No reconstructive microsurgery
Dhage, 2011 ³⁹	Wrong Publication Type	Conference Abstract
Djor, 2019 ⁴⁰	Wrong Population	No reconstructive microsurgery

Drummond, 1991 ⁴¹	Wrong Population	No reconstructive microsurgery
Ebeid, 2019 ⁴²	Wrong Population	No reconstructive microsurgery
El Danaf, 1986 ⁴³	Wrong Population	Unclear Population, authors contacted with no response
El Idrissi, 2016 ⁴⁴	Non-English Language	French
El Idrissi, 2016 ⁴⁴	Duplicate Article	
El Mofty, 2006 ⁴⁵	Wrong Publication Type	Conference Abstract
Elbashir, 2012 ⁴⁶	Wrong Population	No reconstructive microsurgery
Elfeki, 2020 ⁴⁷	Wrong Population	South Korea
El-Gammal, 2002 ⁴⁸	Duplication of patients	El-Gammal, 2002 ⁴⁹
Elghoneimy, 2017 ⁵⁰	Wrong Publication Type	Conference Abstract
Elmaraghi, 2020 ⁵¹	Wrong Population	USA
El-Shazly, 2005 ⁵²	Wrong Outcome	Not clinical
El-Shazly, 2008 ⁵³	Duplication of patients	El-Shazly, 2007 ⁵⁴
El-Sherbiny, 2008 ⁵⁵	Wrong Population	No reconstructive microsurgery
Enwonwu, 2006 ⁵⁶	Wrong Study Design	Review article
Fagan, 2019 ⁵⁷	Wrong Outcome	Not clinical
Fagan, 2017 ⁵⁸	Wrong Study Design	Review article
Falcone, 2016 ⁵⁹	Wrong Population	UK
Fernandes, 2016 ⁶⁰	Wrong Population	No reconstructive microsurgery
Foehn, 2009 ⁶¹	Wrong Population	Germany
Garcia-Sanchez, 2019 ⁶²	Wrong Population	Spain
Giessler, 2003 ⁶³	Duplication of patients	Giessler, 2005 ⁶⁴
Giessler, 2004 ⁶⁵	Duplication of patients	Giessler, 2005 ⁶⁴
Giessler, 2007 ⁶⁶	Duplication of patients	Giessler, 2005 ⁶⁴
Graham, 2002 ⁶⁷	Wrong Population	No reconstructive microsurgery
Grotepass, 1990 ⁶⁸	Wrong Population	No reconstructive microsurgery
Hammer, 1996 ⁶⁹	Wrong Population	No reconstructive microsurgery
Hamouya, 2018 ⁷⁰	Wrong Population	Unclear Population, authors contacted with no response
Hamza, 2010 ⁷¹	Non-English Language	French
Hamza, 2010 ⁷¹	Duplicate Article	
Hashikawa, 2006 ⁷²	Wrong Population	Japan
Hassine, 2016 ⁷³	Wrong Population	No reconstructive microsurgery
Helmy Ali, 2020 ⁷⁴	Wrong Population	No reconstructive microsurgery
Holle, 2020 ⁷⁵	Wrong Population	No reconstructive microsurgery
Holoyda, 2020 ⁷⁶	Wrong Population	No reconstructive microsurgery
Houdek, 2018 ⁷⁷	Wrong Population	USA
Hsu, 2009 ⁷⁸	Wrong Population	Iraq
Hudson, 2001 ⁷⁹	Wrong Population	No reconstructive microsurgery
Hudson, 2001 ⁸⁰	Wrong Population	No reconstructive microsurgery
Huijing, 2011 ⁸¹	Wrong Population	No reconstructive microsurgery

Innocenti, 2009 ⁸²	Wrong Population	Italy
Jean-Pierre, 2008 ⁸³	Wrong Population	UK
Jiang, 2013 ⁸⁴	Wrong Population	China
Jorgenson, 1995 ⁸⁵	Wrong Population	USA
Kalavrezos, 2008 ⁸⁶	Wrong Population	UK
Khalil, 2010 ⁸⁷	Wrong Population	No reconstructive microsurgery
Khalil, 2018 ⁸⁸	Wrong Population	UK
Kinds, 1995 ⁸⁹	Wrong Population	USA
Lazarus, 2001 ⁹⁰	Wrong Outcome	Not clinical
Lekuya, 2018 ⁹¹	Wrong Population	No reconstructive microsurgery
Leonetti, 2008 ⁹²	Wrong Population	USA
Marck, 1998 ⁹³	Wrong Population	No reconstructive microsurgery
Marck, 1999 ⁹⁴	Wrong Study Design	Review article
Mathieu, 2014 ⁹⁵	Wrong Population	No reconstructive microsurgery
Mathieu, 2019 ⁹⁶	Wrong Population	Mixed population treated in Chad and Afghanistan
Mathieu, 2018 ⁹⁷	Wrong Population	Perioperative care in France
Mauramati, 2020 ⁹⁸	Wrong Population	Italy
McAllister, 2016 ⁹⁹	Wrong Population	UK
Mehio, 2018 ¹⁰⁰	Wrong Population	Unclear Population, authors contacted with no response
Mekky, 2018 ¹⁰¹	Duplication of patients	Mekky, 2018 ¹⁰²
Misani, 2013 ¹⁰³	Wrong Population	Belgium
Mofikoya, 2010 ¹⁰⁴	Wrong Publication Type	Conference Abstract
Mofikoya, 2019 ¹⁰⁵	Wrong Population	No reconstructive microsurgery
Mohamed, 2000 ¹⁰⁶	Wrong Population	No reconstructive microsurgery
Moldovan, 2015 ¹⁰⁷	Wrong Population	Romania
Montandon, 2007 ¹⁰⁸	Wrong Study Design	Review article
Moro, 2020 ¹⁰⁹	Wrong Population	Italy
Mousa, 2019 ¹¹⁰	Wrong Population	No reconstructive microsurgery
Muguti, 1990 ¹¹¹	Wrong Population	No reconstructive microsurgery
Nabawi, 1999 ¹¹²	Wrong Population	USA
Nath, 1998 ¹¹³	Wrong Population	No reconstructive microsurgery
Nkenke, 2013 ¹¹⁴	Wrong Population	Germany
Noever, 2000 ¹¹⁵	Wrong Population	Unclear Population, authors contacted with no response
Offodile, 2018 ¹¹⁶	Wrong Population	Taiwan
Ogunbodede, 1997 ¹¹⁷	Wrong Population	No reconstructive microsurgery
Okoturo, 2016 ¹¹⁸	Wrong Population	No reconstructive microsurgery
Okoturo, 2015 ¹¹⁹	Wrong Population	No reconstructive microsurgery
OlaOlorun, 2001 ¹²⁰	Wrong Population	No reconstructive microsurgery
Onah, 2010 ¹²¹	Wrong Population	No reconstructive microsurgery
Ooi, 2017 ¹²²	Wrong Population	USA

Orakwe, 2012 ¹²³	Wrong Population	No reconstructive microsurgery
Osiogo, 2006 ¹²⁴	Wrong Population	Taiwan
Panieri, 2003 ¹²⁵	Wrong Outcome	No microsurgery outcomes
Pittet, 2007 ¹²⁶	Wrong Population	Switzerland
Pittet, 2001 ¹²⁷	Wrong Study Design	Review article
Rashid, 2012 ¹²⁸	Wrong Population	Pakistan
Rasool, 1999 ¹²⁹	Wrong Population	No reconstructive microsurgery
Rodgers, 2015 ¹³⁰	Duplication of patients	Rodgers, 2015 ¹³¹
Rohde, 2013 ¹³²	Wrong Publication Type	Conference Abstract
Ruegg, 2016 ¹³³	Wrong Population	Switzerland
Ruegg, 2018 ¹³⁴	Wrong Population	Switzerland
Sadek, 2014 ¹³⁵	Wrong Population	Unclear Population, authors contacted with no response
Safoury, 2005 ¹³⁶	Wrong Population	No reconstructive microsurgery
Sayed, 2009 ¹³⁷	Wrong Outcome	Not clinical
Schwaiger, 2018 ¹³⁸	Wrong Population	Austria
Shalaby, 1993 ¹³⁹	Wrong Population	No reconstructive microsurgery
Shaye, 2019 ¹⁴⁰	Wrong Population	No reconstructive microsurgery
Sica, 2008 ¹⁴¹	Non-English Language	French
Singhal, 2012 ¹⁴²	Wrong Population	Taiwan
Slyke, 2016 ¹⁴³	Duplication of patients	Citron, 2016 ¹⁴⁴
Sun, 2017 ¹⁴⁵	Wrong Population	USA
Sweed, 2020 ¹⁴⁶	Wrong Population	Italy
Taman, 2019 ¹⁴⁷	Wrong Population	No reconstructive microsurgery
Tulley, 2000 ¹⁴⁸	Wrong Population	UK
Van Wingerden, 1997 ¹⁴⁹	Wrong Outcome	Surgical technique article with no patient outcomes
Vinzenz, 2007 ¹⁵⁰	Wrong Population	No reconstructive microsurgery, Austria
Vinzenz, 2008 ¹⁵¹	Wrong Population	Austria
Woon, 2010 ¹⁵²	Wrong Population	Singapore, Laos
Xingzhou, 2020 ¹⁵³	Wrong Population	China
Yassin, 2007 ¹⁵⁴	Wrong Population	No reconstructive microsurgery
ZAKARIA, 2016 ¹⁵⁵	Wrong Population	Kuwait
Zender, 2018 ¹⁵⁶	Wrong Study Design	Review article
Luo, 2019 ¹⁵⁷	Wrong Population	China
Saboye, 1999 ¹⁵⁸	Non-English Language	French
Hweidi, 2009 ¹⁵⁹	Wrong Publication Type	Conference Abstract

Appendix 5: Study and Patient Characteristics of Included Studies

Reference	Country	Study Design	Number of Patients	Male	Female	Minimum age (years)	Maximum age (years)	Mean age (years)	Number of Procedures	Elective Procedures	Emergency Procedures	Comments
Abbas, 2015 ¹⁶⁰	Egypt	Case Series	16	14	2	18	39	27.4	16	9	7	
Abbas, 2012 ¹⁶¹	Egypt	Case Series	16	13	3	23	45	33.1	16			
Abdel Razek, 2014 ¹⁶²	Egypt	Case Series	65	49	16	18	74	55	65	65		
Abdelkader, 2016 ¹⁶³	Egypt	Case Series	15	15	0	15	46		15			
Abdelrahman, 2016 ¹⁶⁴	Egypt	Randomized Controlled Trial	15	15	0			27.9	15	15		
Abir, 2017 ¹⁶⁵	Morocco	Case Report	1	1	0	70		70	1	1		
Aboelatta, 2013 ¹⁶⁶	Egypt	Case Series	28	20	8	2	15	8.78	28	21	7	
Addosooki, 2020 ¹⁶⁷	Egypt	Case Series	6	5	1	14	54	34.7	6	6		
Addosooki, 2016 ¹⁶⁸	Egypt	Case Series	10	7	3	45	65	55.6	10	10		
Afifi, 2016 ¹⁶⁹	Egypt	Case Series	1						1	1		
Akerzoul, 2017 ¹⁷⁰	Morocco	Case Report	1	0	1	28	28	28	1	1		
Al Maksoud, 2016 ¹⁷¹	Egypt	Case Report	1	0	1	62		62	1	1		
Amer, 2012 ¹⁵	Egypt	Case Series	25	11	14	22	55	34.64	26	26		1 patient had 2 flaps
Amin, 2002 ¹⁷²	Egypt	Case Series	16	9	7	36	76	58	16	16		
Amin, 2010 ¹⁷³	Egypt	Case Report	1	0	1	5		5	1	1		
Amr, 2002 ¹⁷⁴	Egypt	Case Series	14	13	1	5	50	23.6	14	14		
Amr, 2000 ¹⁷⁵	Egypt	Case Series	23	11	12	6	45	18.57	24	24		1 patient had 2 flaps
Ayad, 2017 ¹⁷⁶	Egypt	Case Series	20	18	2	10	45	27.5	20	20		
Ayad, 2017 ¹⁷⁷	Egypt	Case Series	8	2	6	13	40	26.2	8	8		
Ayad, 2019 ¹⁷⁸	Egypt	Case Series	15	13	2	25	50	35.5	15	15		
Ayad, 2012 ¹⁷⁹	Egypt	Case Series	11	11	0	23	51		11			
Badran, 1996 ¹⁸⁰	Egypt	Case Series	10	2	8	5	60		10	10		
Bassiouny, 2005 ¹⁸¹	Egypt	Randomized Controlled Trial	15	0	15	23	50	40.1	15	15		
Chait, 1977 ¹⁸²	South Africa	Case Report	1	1	0	14	14	14	1	1		

Citron, 2016 ¹⁴⁴	Uganda	Case Series	100			3	61		114			12 patients had 2 flaps and 1 had 3 flaps
Daya, 2009 ¹⁸³	South Africa	Case Report	1	1	0	13	13	13	1	1		
Daya, 2009 ¹⁸⁴	South Africa	Case Series	5	5	0	15	67		6	6		1 patient had 2 flaps
Daya, 2019 ¹⁸⁵	South Africa	Case Series	6	4	2	14	75	52.17	6	6		
Daya, 2008 ¹⁸⁶	South Africa	Case Report	1	0	1	47	47	47	1	1		
Daya, 2018 ¹⁸⁷	South Africa	Case Series	2						2	2		
Denewer, 2011 ¹⁸⁸	Egypt	Case Series	5			45	60	52	5	5		
Denewer, 2014 ¹⁸⁹	Egypt	Case Series	28						28	28		
El Fahar, 2018 ¹⁹⁰	Egypt	Case Report	1	1	0	1.2	1.2	1.2	1	1		
Elfeky, 2015 ¹⁹¹	Egypt	Retrospective Cohort Study	37	21	15			60.8	37	37		number of male, female unclear
El-Gammal, 2012 ¹⁹²	Egypt	Case Series	42	32	10	2.5	13	6.18	42	42		
El-Gammal, 2015 ¹⁹³	Egypt	Case Series	18	6	12	1.75	30	8.54	18	18		
El-Gammal, 2010 ¹⁹⁴	Egypt	Case Series	7	5	2	14	40	28	7	7		
El-Gammal, 2008 ¹⁹⁵	Egypt	Cohort Study	13	11	2			31.5	13	13		
El-Gammal, 2002 ⁴⁹	Egypt	Case Series	25	13	12	11	50	23.5	25	25		
El-Gammal, 2001 ¹⁹⁶	Egypt	Case Series	1	1	0	15		15	1	1		
El-Gammal, 2002 ¹⁹⁷	Egypt	Case Series	6	2	4	7	16	11	6	6		
El-Gammal, 2004 ¹⁹⁸	Egypt	Case Series	3	3	0	7	12	9.67	3	3		
El-Marakby, 2009 ¹⁹⁹	Egypt	Case Series	10	0	10				10	10		
El-Shazly, 2007 ⁵⁴	Egypt	Case Series	11			8	53		11			
Elsherbiny, 2008 ²⁰⁰	Egypt	Case Series	10	7	3	41	55	42.7	10	10		
El-Zohairy, 2007 ²⁰¹	Egypt	Case Series	2						2	2		
Fasika, 1995 ²⁰²	Nigeria	Case Series	1	0	1	40		40	1	1	0	
Fejjal, 2013 ²⁰³	Morocco	Case Report	1	1	0	70		70	1	1		
Gad, 2015 ²⁰⁴	Egypt	Case Series	3	0	3	41	55		3	3		
Galiwango, 2009 ²⁰⁵	Uganda	Case Series	18	10	8	7	42	23	19			1 patient had 2 flaps
Gbotolorun, 2016 ²⁰⁶	Nigeria	Case Series	1						1	1		
Ghareeb, 2002 ²⁰⁷	Egypt	Case Series	2						2	2		
Ghoneimy, 2018 ²⁰⁸	Egypt	Case Series	41	24	17	5	17	10.3	41	41	0	
Giessler, 2012 ²⁰⁹	Ethiopia	Case Series	3	1	2	12	39	22.67	3	3		Includes sequential chimeric flaps

Giessler, 2005 ⁶⁴	Nigeria	Case Series	31	13	18	5	45	22.48	31	31	0	
Graham, 2003 ²¹⁰	South Africa	Case Series	43	28	15	13	82	47.7	47	47		1 patient died on day 5
Hudson, 1993 ²¹¹	South Africa	Case Series	6						6	0	6	4 patients had repair of both radial and ulna arteries; 2 patients had only 1 artery repaired
Liakos, 2019 ²¹²	South Africa	Case Report	1	0	1	31		31	1	1	0	
Sedira, 2006 ²¹³	Egypt	Case Series	9						9	9		
Madaree, 1993 ²¹⁴	South Africa	Case Report	1	1	0			42	1	1		
Madaree, 1993 ²¹⁵	South Africa	Case Series	1	1	0	25		25	1			
Magdy, 2008 ²¹⁶	Egypt	Case Series	3	3	0	34	70	53	3	3		
Meky, 2011 ²¹⁷	Egypt	Case Series	6	4	2	14	46		6	4	2	
Meky, 2015 ¹⁰²	Egypt	Case Series	12	11	1	8	49	34.6	12	12		
Mofikoya, 2018 ²¹⁸	Nigeria	Case Series	21			7	72	35.5	21			23 procedures performed but only 21 analyzed
Mofikoya, 2014 ²¹⁹	Nigeria	Case Series	15	7	8				15			
Nabawi, 2003 ²²⁰	Egypt	Case Series	14	8	6	35	67	47.67	14	14	0	
Nangole, 2015 ²²¹	Kenya	Case Series	120	73	49	8	72	47.2	132			
Noaman, 2019 ²²²	Egypt	Case Series	32	24	8	6	33	22	32	1	31	
Noaman, 2007 ²²³	Egypt	Case Series	7						7		7	
Noaman, 2013 ²²⁴	Egypt	Case Series	16	11	5			35.2	16	16	0	
Noaman, 2006 ²²⁵	Egypt	Case Series	25						25			
Noaman, 2002 ²²⁶	Egypt	Case Report	1	1	0	9		9	2		2	1 patient 2 procedures done 3 weeks apart
Okoturo, 2017 ²²⁷	Nigeria	Case Series	8	5	3	24	62	39.4	8	8	0	
Olusoga, 2016 ²²⁸	Nigeria	Case Series	2	1	1	22	40	31	2	2		
Oluwatosin, 2000 ²²⁹	Nigeria	Case Series	2	1	1				2	2	0	
Passos, 2015 ²³⁰	South Africa	Case Series	100	65	35	19	83	55	100	100		109 flaps performed, 8 patients excluded due to unavailable records and 1 patient died
Pearce, 2013 ²³¹	Kenya	Case Series	3						3	3	0	
Rifaat, 2006 ²³²	Egypt	Case Series	2	1	1	55	58	56.5	2	2		
Rodgers, 2015 ¹³¹	Ethiopia	Case Series	29	10	19	8	45	21.62	34	34	0	5 patients had 2 flaps
Safoury, 2005 ²³³	Egypt	Case Series	18	16	2	22	46	34	18	18		

Salem, 2009 ²³⁴	Egypt	Case Report	1	1	0	23		23	1	0	1	
Semaya, 2016 ²³⁵	Egypt	Case Series	4	3	1	25	65	46.5	4	4		10 patients had pedicled ipsilateral fibula transfers
Shaker, 2003 ²³⁶	Egypt	Case Series	5	4	1	26	52	40.6	5	3	2	Gender not clearly in case 4
Shaker, 2016 ²³⁷	Egypt	Case Series	18	14	4	14	65	37.2	18	18		
Sief, 2010 ²³⁸	Egypt	Case Series	7			8	27	17	7	7		
Tazi, 2011 ²³⁹	Morocco	Case Report	1	1	0	27		27	1		1	penile replantation only microsurgical veins repair, no arteries were repaired
Tocco-Tussardi, 2016 ²⁴⁰	Kenya	Case Series	2	2	0	14	17	15.5	2	2	0	
van der Merwe, 2017 ²⁴¹	South Africa	Case Report	1	1	0	21		21	1	1	0	
van Lierop, 2007 ²⁴²	South Africa	Case Report	1	0	1	18		18	1	1	0	
Visse, 1976 ²⁴³	South Africa	Case Report	1	0	1	16	16	16	1	1		
Wamalwa, 2019 ²⁴⁴	Kenya	Case Series	20	6	14	6	50	30.5	20	20	0	

Appendix 6: Risk of Bias Assessment Summary

Joanna Briggs Institute (JBI) Critical Appraisal Checklists

Reference	Study design	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Overall Appraisal
Abbas, 2015 ¹⁶⁰	Case Series	No	Yes	Yes	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes				Include
Abbas, 2012 ¹⁶¹	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	N/A				Include
Abdel Razek, 2014 ¹⁶²	Case Series	No	Unclear	Unclear	Yes	Unclear	Yes	No	No	Yes	Yes				Include
Abdelkader, 2016 ¹⁶³	Case Series	No	Unclear	No	Unclear	Unclear	Yes	No	No	Yes	N/A				Include
Abdelrahman, 2016 ¹⁶⁴	RCT	Yes	Yes	Yes	No	No	No	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Include
Abir, 2017 ¹⁶⁵	Case Report	Yes	Yes	Yes	Yes	Yes	No	No	Unclear						Include
Aboelatta, 2013 ¹⁶⁶	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include
Addosooki, 2020 ¹⁶⁷	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Addosooki, 2016 ¹⁶⁸	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes				Include
Afifi, 2016 ¹⁶⁹	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes				Include
Akerzoul, 2017 ¹⁷⁰	Case Report	Yes	Yes	Yes	Yes	No	No	No	Unclear						Include
Al Maksoud, 2016 ¹⁷¹	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
Amer, 2012 ¹⁵	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes				Include
Amin, 2002 ¹⁷²	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Amin, 2010 ¹⁷³	Case Report	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes						Include
Amr, 2002 ¹⁷⁴	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	N/A				Include
Amr, 2000 ¹⁷⁵	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	Yes				Include
Ayad, 2017 ¹⁷⁶	Case Series	No	Yes	Yes	Unclear	Yes	Yes	Yes	No	Yes	N/A				Include
Ayad, 2017 ¹⁷⁷	Case Series	No	Unclear	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Ayad, 2019 ¹⁷⁸	Case Series	No	Unclear	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	N/A				Include
Ayad, 2012 ¹⁷⁹	Case Series	Unclear	Unclear	Yes	Unclear	Unclear	Unclear	No	Yes	Yes	N/A				Include
Badran, 1996 ¹⁸⁰	Case Series	Unclear	Yes	Yes	Unclear	Unclear	No	Yes	Yes	Yes	N/A				Include
Bassiouny, 2005 ¹⁸¹	RCT	Unclear	No	Yes	No	No	Unclear	Yes	Unclear	Unclear	Yes	Yes	Unclear	Unclear	Include


































Chait, 1977 ¹⁸²	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
Citron, 2016 ¹⁴⁴	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes				Include
Daya, 2009 ¹⁸³	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
Daya, 2009 ¹⁸⁴	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Daya, 2019 ¹⁸⁵	Case Series	Yes	Unclear	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Daya, 2008 ¹⁸⁶	Case Report	Yes	Yes	Yes	Yes	Yes	No	Unclear	Yes						Include
Daya, 2018 ¹⁸⁷	Case Series	Unclear	Yes	Yes	Unclear	Unclear	No	No	No	Yes	N/A				Include
Denewer, 2011 ¹⁸⁸	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	N/A				Include
Denewer, 2014 ¹⁸⁹	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	No	Yes	Unclear				Include
El Fahar, 2018 ¹⁹⁰	Case Report	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes						Include
Elfeky, 2015 ¹⁹¹	Cohort Study	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear			Include
El-Gammal, 2012 ¹⁹²	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
El-Gammal, 2015 ¹⁹³	Case Series	Yes	Unclear	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	No				Include
El-Gammal, 2010 ¹⁹⁴	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
El-Gammal, 2008 ¹⁹⁵	Cohort Study	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Unclear	Yes			Include
El-Gammal, 2002 ⁴⁹	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Unclear				Include
El-Gammal, 2001 ¹⁹⁶	Case Series	No	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
El-Gammal, 2002 ¹⁹⁷	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	N/A				Include
El-Gammal, 2004 ¹⁹⁸	Case Series	No	Yes	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
El-Marakby, 2009 ¹⁹⁹	Case Series	Unclear	No	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes				Include
El-Shazly, 2007 ⁵⁴	Case Series	Unclear	Unclear	Yes	Unclear	Unclear	No	No	No	Yes	N/A				Include
Elshebiny, 2008 ²⁰⁰	Case Series	Yes	Yes	Yes	Unclear	Unclear	No	Yes	Yes	Unclear	N/A				Include
El-Zohairy, 2007 ²⁰¹	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include
Fasika, 1995 ²⁰²	Case Series	No	Yes	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Fejjal, 2013 ²⁰³	Case Report	Yes	Yes	No	No	No	No	Unclear	Unclear						Include
Gad, 2015 ²⁰⁴	Case Series	Unclear	Yes	Yes	Yes	Yes	Yes	No	No	Yes	N/A				Include
Galiwango, 2009 ²⁰⁵	Case Series	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	N/A				Include

Gbotolorun, 2016 ²⁰⁶	Case Series	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	N/A				Include
Ghareeb, 2002 ²⁰⁷	Case Series	Unclear	Yes	Yes	Unclear	Unclear	No	No	Unclear	Yes	N/A				Include
Ghoneimy, 2018 ²⁰⁸	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include
Giessler, 2012 ²⁰⁹	Case Series	No	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	No	N/A				Include
Giessler, 2005 ⁶⁴	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Graham, 2003 ²¹⁰	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include
Hudson, 1993 ²¹¹	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	N/A				Include
Liakos, 2019 ²¹²	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
Sedira, 2006 ²¹³	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	N/A				Include
Madaree, 1993 ²¹⁴	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes						Include
Madaree, 1993 ²¹⁵	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Magdy, 2008 ²¹⁶	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include
Meky, 2011 ²¹⁷	Case Series	No	Unclear	Unclear	Unclear	Unclear	No	Yes	Yes	Yes	N/A				Include
Meky, 2015 ¹⁰²	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Mofikoya, 2018 ²¹⁸	Case Series	Yes	Unclear	Yes	Yes	Yes	No	No	No	No	N/A				Include
Mofikoya, 2014 ²¹⁹	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	N/A				Include
Nabawi, 2003 ²²⁰	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes				Include
Nangole, 2015 ²²¹	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	N/A				Include
Noaman, 2019 ²²²	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Noaman, 2007 ²²³	Case Series	Yes	Unclear	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Noaman, 2013 ²²⁴	Case Series	Unclear	Yes	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Noaman, 2006 ²²⁵	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Noaman, 2002 ²²⁶	Case Report	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes						Include
Okoturo, 2017 ²²⁷	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Unclear				Include
Olusoga, 2016 ²²⁸	Case Series	No	Yes	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Oluwatosin, 2000 ²²⁹	Case Series	No	Unclear	Unclear	No	No	No	No	No	Yes	N/A				Include
Passos, 2015 ²³⁰	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include

Pearce, 2013 ²³¹	Case Series	Yes	Yes	Yes	Unclear	Yes	Yes	No	No	Yes	N/A				Include
Rifaat, 2006 ²³²	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Rodgers, 2015 ¹³¹	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Safoury, 2005 ²³³	Case Series	Yes	Unclear	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Salem, 2009 ²³⁴	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
Semaya, 2016 ²³⁵	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Unclear				Include
Shaker, 2003 ²³⁶	Case Series	Unclear	Yes	Unclear	Unclear	Unclear	Yes	Yes	No	Yes	N/A				Include
Shaker, 2016 ²³⁷	Case Series	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
Sief, 2010 ²³⁸	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	N/A				Include
Tazi, 2011 ²³⁹	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	Yes						Include
Tocco-Tussardi, 2016 ²⁴⁰	Case Series	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	N/A				Include
van der Merwe, 2017 ²⁴¹	Case Report	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes						Include
van Lierop, 2007 ²⁴²	Case Report	Yes	Yes	Yes	Yes	No	No	Unclear	Yes						Include
Visse, 1976 ²⁴³	Case Report	Yes	Yes	Yes	Yes	Yes	No	Unclear	Yes						Include
Wamalwa, 2019 ²⁴⁴	Case Series	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A				Include

Appendix 7: Assessment of Quality of Evidence

GRADE Quality of Evidence Assessment

Reference	Study design	GRADE Quality of Evidence
Abbas, 2015 ¹⁶⁰	Case Series	Very Low 
Abbas, 2012 ¹⁶¹	Case Series	Low-Moderate 
Abdel Razek, 2014 ¹⁶²	Case Series	Low 
Abdelkader, 2016 ¹⁶³	Case Series	Very Low 
Abdelrahman, 2016 ¹⁶⁴	Randomized Controlled Trial	High 
Abir, 2017 ¹⁶⁵	Case Report	Very Low 
Aboelatta, 2013 ¹⁶⁶	Case Series	Moderate 
Addosooki, 2020 ¹⁶⁷	Case Series	Low 
Addosooki, 2016 ¹⁶⁸	Case Series	Low 
Afifi, 2016 ¹⁶⁹	Case Series	Low 
Akerzoul, 2017 ¹⁷⁰	Case Report	Very Low 
Al Maksoud, 2016 ¹⁷¹	Case Report	Very Low 
Amer, 2012 ¹⁵	Case Series	Low 
Amin, 2002 ¹⁷²	Case Series	Low 
Amin, 2010 ¹⁷³	Case Report	Very Low 
Amr, 2002 ¹⁷⁴	Case Series	Low 
Amr, 2000 ¹⁷⁵	Case Series	Low 
Ayad, 2017 ¹⁷⁶	Case Series	Low 
Ayad, 2017 ¹⁷⁷	Case Series	Low 
Ayad, 2019 ¹⁷⁸	Case Series	Low 
Ayad, 2012 ¹⁷⁹	Case Series	Very Low 
Badran, 1996 ¹⁸⁰	Case Series	Low 
Bassiouny, 2005 ¹⁸¹	Randomized Controlled Trial	Moderate 
Chait, 1977 ¹⁸²	Case Report	Low 
Citron, 2016 ¹⁴⁴	Case Series	High 
Daya, 2009 ¹⁸³	Case Report	Very Low 
Daya, 2009 ¹⁸⁴	Case Series	Low 
Daya, 2019 ¹⁸⁵	Case Series	Low 
Daya, 2008 ¹⁸⁶	Case Report	Very Low 
Daya, 2018 ¹⁸⁷	Case Series	Very Low 
Denewer, 2011 ¹⁸⁸	Case Series	Low 
Denewer, 2014 ¹⁸⁹	Case Series	Low 
El Fahar, 2018 ¹⁹⁰	Case Report	Very Low 

Elfeky, 2015 ¹⁹¹	Cohort Study	Moderate	★
El-Gammal, 2012 ¹⁹²	Case Series	Low	★
El-Gammal, 2015 ¹⁹³	Case Series	Very Low	★
El-Gammal, 2010 ¹⁹⁴	Case Series	Very Low	★
El-Gammal, 2008 ¹⁹⁵	Cohort Study	Low	★
El-Gammal, 2002 ⁴⁹	Case Series	Low	★
El-Gammal, 2001 ¹⁹⁶	Case Series	Very Low	★
El-Gammal, 2002 ¹⁹⁷	Case Series	Low	★
El-Gammal, 2004 ¹⁹⁸	Case Series	Low	★
El-Marakby, 2009 ¹⁹⁹	Case Series	Low	★
El-Shazly, 2007 ⁵⁴	Case Series	Very Low	★
Elshebiny, 2008 ²⁰⁰	Case Series	Low	★
El-Zohairy, 2007 ²⁰¹	Case Series	Low	★
Fasika, 1995 ²⁰²	Case Series	Very Low	★
Fejjal, 2013 ²⁰³	Case Report	Very Low	★
Gad, 2015 ²⁰⁴	Case Series	Very Low	★
Galiwango, 2009 ²⁰⁵	Case Series	Low	★
Gbotolorun, 2016 ²⁰⁶	Case Series	Very Low	★
Ghareeb, 2002 ²⁰⁷	Case Series	Very Low	★
Ghoneimy, 2018 ²⁰⁸	Case Series	Moderate	★
Giessler, 2012 ²⁰⁹	Case Series	Low	★
Giessler, 2005 ⁶⁴	Case Series	Low-Moderate	★
Graham, 2003 ²¹⁰	Case Series	Moderate	★
Hudson, 1993 ²¹¹	Case Series	Very Low	★
Liakos, 2019 ²¹²	Case Report	Very Low	★
Sedira, 2006 ²¹³	Case Series	Very Low	★
Madaree, 1993 ²¹⁴	Case Report	Very Low	★
Madaree, 1993 ²¹⁵	Case Series	Very Low	★
Magdy, 2008 ²¹⁶	Case Series	Very Low	★
Meky, 2011 ²¹⁷	Case Series	Low	★
Meky, 2015 ¹⁰²	Case Series	Very Low	★
Mofikoya, 2018 ²¹⁸	Case Series	Low	★
Mofikoya, 2014 ²¹⁹	Case Series	Low-Moderate	★
Nabawi, 2003 ²²⁰	Case Series	Low-Moderate	★
Nangole, 2015 ²²¹	Case Series	Moderate	★
Noaman, 2019 ²²²	Case Series	Low	★
Noaman, 2007 ²²³	Case Series	Low	★
Noaman, 2013 ²²⁴	Case Series	Very Low	★
Noaman, 2006 ²²⁵	Case Series	Low	★

Noaman, 2002 ²²⁶	Case Report	Low	★
Okoturo, 2017 ²²⁷	Case Series	Low	★
Olusoga, 2016 ²²⁸	Case Series	Very Low	★
Oluwatosin, 2000 ²²⁹	Case Series	Very Low	★
Passos, 2015 ²³⁰	Case Series	Moderate	★
Pearce, 2013 ²³¹	Case Series	Very Low	★
Rifaat, 2006 ²³²	Case Series	Low	★
Rodgers, 2015 ¹³¹	Case Series	Low-Moderate	★
Safoury, 2005 ²³³	Case Series	Low	★
Salem, 2009 ²³⁴	Case Report	Low	★
Semaya, 2016 ²³⁵	Case Series	Low	★
Shaker, 2003 ²³⁶	Case Series	Very Low	★
Shaker, 2016 ²³⁷	Case Series	Low	★
Sief, 2010 ²³⁸	Case Series	Low	★
Tazi, 2011 ²³⁹	Case Report	Very Low	★
Tocco-Tussardi, 2016 ²⁴⁰	Case Series	Very Low	★
van der Merwe, 2017 ²⁴¹	Case Report	Low	★
van Lierop, 2007 ²⁴²	Case Report	Very Low	★
Visse, 1976 ²⁴³	Case Report	Very Low	★
Wamalwa, 2019 ²⁴⁴	Case Series	Low	★

GRADE Assessment Key:



High



Low

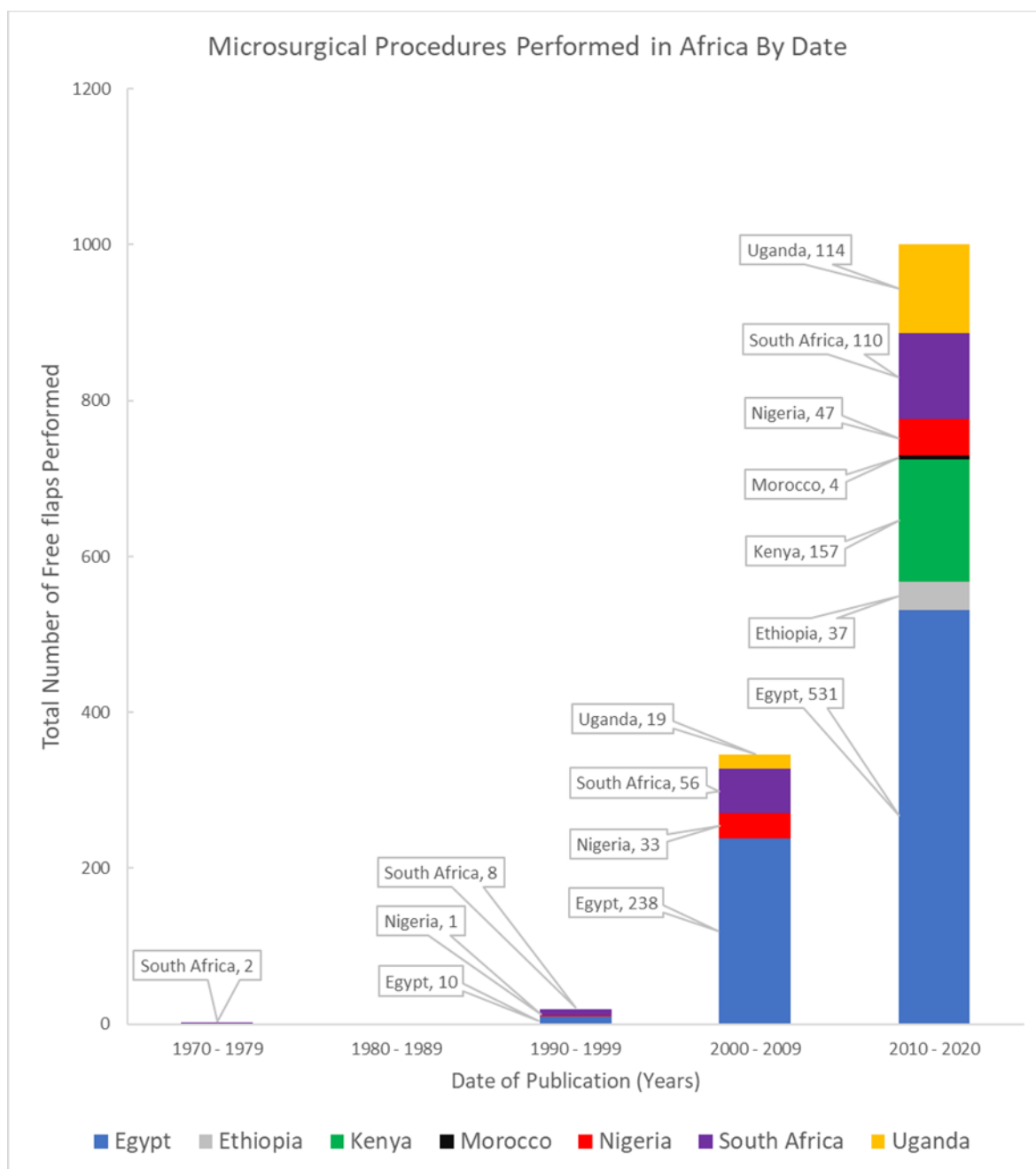


Moderate



Very Low

Appendix 8: Microsurgery Procedures Performed in Africa (1976 – 2020) By Date of Publication



Appendix 9: Indications for Reconstructive Microsurgery

Reference	Post burn	Noma	Head and neck tumor	Breast	Upper limb trauma	Lower limb trauma	Head and neck trauma	Lower Limb tumors	Chronic Osteomyelitis	Others
Abbas, 2015 ¹⁶⁰						11		2		3
Abbas, 2012 ¹⁶¹	7					7		2		0
Abdel Razek, 2014 ¹⁶²										65
Abdelkader, 2016 ¹⁶³					15					0
Abdelrahman, 2016 ¹⁶⁴						15				0
Abir, 2017 ¹⁶⁵			1							0
Aboelatta, 2013 ¹⁶⁶			1		15	8				4
Addosooki, 2020 ¹⁶⁷					6					0
Addosooki, 2016 ¹⁶⁸										10
Afifi, 2016 ¹⁶⁹	1									0
Akerzoul, 2017 ¹⁷⁰			1							0
Al Maksoud, 2016 ¹⁷¹								1		0
Amer, 2012 ¹⁵										26
Amin, 2002 ¹⁷²			16							0
Amin, 2010 ¹⁷³							1			0
Amr, 2002 ¹⁷⁴						14				0
Amr, 2000 ¹⁷⁵								24		0
Ayad, 2017 ¹⁷⁶			2				4			2
Ayad, 2017 ¹⁷⁷						20				0
Ayad, 2019 ¹⁷⁸						15				0
Ayad, 2012 ¹⁷⁹					5	6				0
Badran, 1996 ¹⁸⁰										10
Bassiouny, 2005 ¹⁸¹				15						0
Chait, 1977 ¹⁸²					1					0
Citron, 2016 ¹⁴⁴	13		50						18	33
Daya, 2009 ¹⁸³			1							0

Daya, 2009 ¹⁸⁴		2	4						0
Daya, 2019 ¹⁸⁵		1	5						0
Daya, 2008 ¹⁸⁶						1			0
Daya, 2018 ¹⁸⁷			2						0
Denewer, 2011 ¹⁸⁸			5						0
Denewer, 2014 ¹⁸⁹			28						0
El Fahar, 2018 ¹⁹⁰	1								0
Elfeky, 2015 ¹⁹¹			37						0
El-Gammal, 2012 ¹⁹²									18
El-Gammal, 2015 ¹⁹³									6
El-Gammal, 2010 ¹⁹⁴									3
El-Gammal, 2008 ¹⁹⁵									1
El-Gammal, 2002 ⁴⁹					42				0
El-Gammal, 2001 ¹⁹⁶							7		0
El-Gammal, 2002 ¹⁹⁷					13				0
El-Gammal, 2004 ¹⁹⁸							25		0
El-Marakby, 2009 ¹⁹⁹			10						0
El-Shazly, 2007 ⁵⁴					6				5
Elsherbiny, 2008 ²⁰⁰			10						0
El-Zohairy, 2007 ²⁰¹			2						0
Fasika, 1995 ²⁰²							1		0
Fejjal, 2013 ²⁰³									1
Gad, 2015 ²⁰⁴			3						0
Galiwango, 2009 ²⁰⁵	2	1	7	1	2	2			4
Gbotolorun, 2016 ²⁰⁶			1						0
Ghareeb, 2002 ²⁰⁷									2
Ghoneimy, 2018 ²⁰⁸							41		0
Giessler, 2012 ²⁰⁹		3							0
Giessler, 2005 ⁶⁴		31							0
Graham, 2003 ²¹⁰			43			1		1	2
Hudson, 1993 ²¹¹				6					0
Liakos, 2019 ²¹²									1
Sedira. 2006 ²¹³			9						0

Madaree, 1993 ²¹⁴			1						0
Madaree, 1993 ²¹⁵						1			0
Magdy, 2008 ²¹⁶									3
Meky, 2011 ²¹⁷				6					0
Meky, 2015 ¹⁰²	3			9					0
Mofikoya, 2018 ²¹⁸									21
Mofikoya, 2014 ²¹⁹			3	5	4	1	1		1
Nabawi, 2003 ²²⁰			14						0
Nangole, 2015 ²²¹	8		36						88
Noaman, 2019 ²²²				4				9	3
Noaman, 2007 ²²³					32				0
Noaman, 2013 ²²⁴				7					0
Noaman, 2006 ²²⁵				25					0
Noaman, 2002 ²²⁶				2					0
Okoturo, 2017 ²²⁷			8						0
Olusoga, 2016 ²²⁸			2						0
Oluwatosin, 2000 ²²⁹			1						1
Passos, 2015 ²³⁰			100						0
Pearce, 2013 ²³¹									3
Rifaat, 2006 ²³²			2						0
Rodgers, 2015 ¹³¹	1	32	1						0
Safoury, 2005 ²³³				18					0
Salem, 2009 ²³⁴									1
Semaya, 2016 ²³⁵					4				0
Shaker, 2003 ²³⁶				1	2				2
Shaker, 2016 ²³⁷			8			9		1	0
Sief, 2010 ²³⁸					7				0
Tazi, 2011 ²³⁹									1
Tocco-Tussardi, 2016 ²⁴⁰	2								0
van der Merwe, 2017 ²⁴¹									1
van Lierop, 2007 ²⁴²			1						0
Visse, 1976 ²⁴³	1								0

Wamalwa, 2019 ²⁴⁴																			20
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Appendix 10: Indications for Reconstructive Microsurgery (Others)

Reference	Upper limb tumors	Penile trauma	Abdominal tumor	chronic ulcers	Scars and Keloids	Facial nerve defect	Limb nerve defect	Vascular malformations / tumors	Hemifacial Atrophy / microsomia	Brachial plexus injury	Lymphedema	Penile defect	Head and Neck Infection	Tumor Not recorded	Head and Neck defect	Limb defects	Trauma Not recorded	Not recorded
Abbas, 2012 ¹⁶¹				3														
Abdel Razek, 2014 ¹⁶²															65			
Aboelatta, 2013 ¹⁶⁶		1							3									
Addosooki, 2016 ¹⁶⁸															10			
Amer, 2012 ¹⁵						26												
Ayad, 2017 ¹⁷⁷								2										
Badran, 1996 ¹⁸⁰									7						3			
Citron, 2016 ¹⁴⁴			1	2	2								6	1		1	19	1
El-Gammal, 2015 ¹⁹³										18								
El-Gammal, 2001 ¹⁹⁶	1																	
El-Gammal, 2002 ¹⁹⁷						6												
El-Gammal, 2004 ¹⁹⁸																3		
El-Shazly, 2007 ⁵⁴				2	3													
Fejjal, 2013 ²⁰³			1															
Galiwango, 2009 ²⁰⁵				1					1				1					1
Ghareeb, 2002 ²⁰⁷																2		
Graham, 2003 ²¹⁰																	2	
Liakos, 2019 ²¹²											1							
Magdy, 2008 ²¹⁶															3			

Mofikoya, 2018 ²¹⁸																		21
Mofikoya, 2014 ²¹⁹													1					
Nangole, 2015 ²²¹										8	3				47	18		12
Noaman, 2013 ²²⁴	3																	
Oluwatosin, 2000 ²²⁹												1						
Pearce, 2013 ²³¹																		3
Salem, 2009 ²³⁴		1																
Shaker, 2003 ²³⁶		2																
Tazi, 2011 ²³⁹		1																
van der Merwe, 2017 ²⁴¹		1																
Wamalwa, 2019 ²⁴⁴											20							

Appendix 11: Indications for Reconstructive Microsurgery Subgroup Analysis

Figure: Indications for Reconstructive Microsurgery by Region, Surgeon, Time Period and Method of Magnification

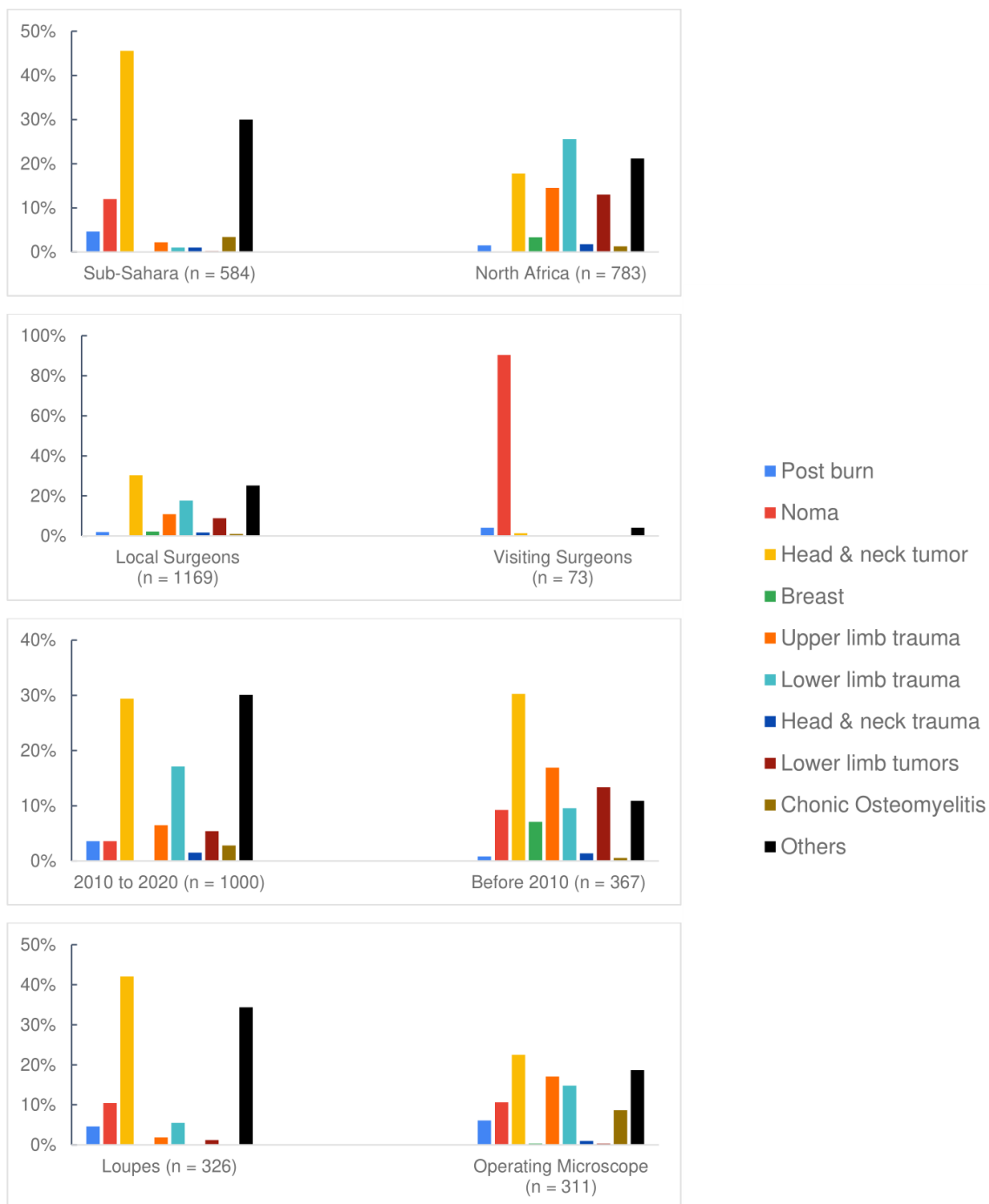


Table: Indications for Reconstructive Microsurgery by Region, Surgeon, Time Period and Method of Magnification

	<i>Post burn</i>	<i>Noma</i>	<i>Head & neck tumor</i>	<i>Breast</i>	<i>Upper limb trauma</i>	<i>Lower limb trauma</i>	<i>Head & neck trauma</i>	<i>Lower limb tumor</i>	<i>Chronic Osteomyelitis</i>	<i>Others</i>	<i>P value</i>
<i>Sub-Sahara (n = 584)</i>	27 (4.6%) *	70 (12.0%) N	266 (45.5%) ***	0 (0.0%) N	13 (2.2%) ***	6 (1.0%) ***	6 (1.0%)	1 (0.2%) ***	20 (3.4%)	175 (30.0%)	<.001
<i>North Africa (n = 783)</i>	12 (1.5%)	0 (0.0%)	139 (17.8%)	26 (3.3%)	114 (14.6%)	200 (25.5%)	14 (1.8%)	102 (13.0%)	10 (1.3%)	166 (21.2%)	
<i>Resident Local Surgeons (n = 1169)</i>	22 (1.9%) ***	4 (0.3%) ***	354 (30.3%) ***	26 (2.2%) N	127 (10.9%) N	206 (17.6%) N	20 (1.7%) N	103 (8.8%) N	12 (1.0%) N	295 (25.2%) ***	<.001
<i>Visiting Surgeons (n=73)</i>	3 (4.1%)	66 (90.4%)	1 (1.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (4.1%)	
<i>2010 to 2020 (n = 1000)</i>	36 (3.6%) ***	36 (3.6%)	294 (29.4%) ***	0 (0.0%) N	65 (6.5%)	171 (17.1%) ***	15 (1.5%) *	54 (5.4%)	28 (2.8%) ***	301 (30.1%) ***	<.001
<i>Before 2010 (n = 367)</i>	3 (0.8%)	34 (9.3%)	111 (30.2%)	26 (7.1%)	62 (16.9%)	35 (9.5%)	5 (1.4%)	49 (13.4%)	2 (0.5%)	40 (10.9%)	
<i>Loupes (n = 362)</i>	15 (4.6%)	34 (10.4%)	137 (42.0%) ***	0 (0.0%) N	6 (1.8%) ***	18 (5.5%) ***	0 (0.0%) N	4 (1.2%)	0 (0.0%) N	112 (34.4%) ***	<.001
<i>Operating Microscope (n= 311)</i>	19 (6.1%)	33 (10.6%)	70 (22.5%)	1 (0.3%)	53 (17.0%)	46 (14.8%)	3 (1.0%)	1 (0.3%)	27 (8.7%)	58 (18.6%)	

*Chi-Square test result: *** = $p < .001$, ** = $p < .01$, * = $p < .05$, N = Not performed*

Appendix 12: Reconstructive Microsurgical Procedures Performed

Reference	Lead Surgeon	Magnification	ALT	Free Gracilis	RFFF	Free Fibula	Free Jejunum	Parascapular Flap	Rectus Abd Muscle flap	LD	Finger replantation	Others
Abbas, 2015 ¹⁶⁰	Resident local surgeon	Loupes	16									0
Abbas, 2012 ¹⁶¹	Resident local surgeon	Loupes		16								0
Abdel Razek, 2014 ¹⁶²	Resident local surgeon	Not stated	9		9	12	25					10
Abdelkader, 2016 ¹⁶³	Resident local surgeon	Not stated	15									0
Abdelrahman, 2016 ¹⁶⁴	Resident local surgeon	Not stated		15								0
Abir, 2017 ¹⁶⁵	Resident local surgeon	Not stated				1						0
Aboelatta, 2013 ¹⁶⁶	Resident local surgeon	Operating Microscope			1	1			13	1	5	7
Addosooki, 2020 ¹⁶⁷	Resident local surgeon	Not stated				6						0
Addosooki, 2016 ¹⁶⁸	Not stated	Operating Microscope				10						0
Afifi, 2016 ¹⁶⁹	Not stated	Not stated			1							0
Akerzoul, 2017 ¹⁷⁰	Resident local surgeon	Not stated				1						0
Al Maksoud, 2016 ¹⁷¹	Resident local surgeon	Not stated								1		0
Amer, 2012 ¹⁵	Resident local surgeon	Not stated								26		0
Amin, 2002 ¹⁷²	Resident local surgeon	Not stated	3		8							5
Amin, 2010 ¹⁷³	Resident local surgeon	Not stated			1							0
Amr, 2002 ¹⁷⁴	Resident local surgeon	Not stated				14						0
Amr, 2000 ¹⁷⁵	Resident local surgeon	Not stated				24						0
Ayad, 2017 ¹⁷⁶	Resident local surgeon	Not stated								20		0

Ayad, 2017 ¹⁷⁷	Resident local surgeon	Not stated								8		0
Ayad, 2019 ¹⁷⁸	Resident local surgeon	Not stated								15		0
Ayad, 2012 ¹⁷⁹	Resident local surgeon	Not stated							11			0
Badran, 1996 ¹⁸⁰	Resident local surgeon	Not stated										10
Bassiouny, 2005 ¹⁸¹	Resident local surgeon	Not stated										15
Chait, 1977 ¹⁸²	Resident local surgeon	Operating Microscope										1
Citron, 2016 ¹⁴⁴	Mixed (Locals and visiting surgeons) NB: 80 cases performed by local resident surgeons, 33 by visiting surgeons, 1 case NR	Operating Microscope	30	8	7	41		2	7	9		10
Daya, 2009 ¹⁸³	Resident local surgeon	Not stated								1		0
Daya, 2009 ¹⁸⁴	Resident local surgeon	Not stated			6							0
Daya, 2019 ¹⁸⁵	Resident local surgeon	Not stated			3				1	2		0
Daya, 2008 ¹⁸⁶	Resident local surgeon	Not stated				1						0
Daya, 2018 ¹⁸⁷	Resident local surgeon	Not stated			1							1
Denewer, 2011 ¹⁸⁸	Resident local surgeon	Not stated	1							4		0
Denewer, 2014 ¹⁸⁹	Resident local surgeon	Not stated					28					0
El Fahar, 2018 ¹⁹⁰	Resident local surgeon	Not stated	1									0
Elfeky, 2015 ¹⁹¹	Resident local surgeon	Not stated					37					0
El-Gammal, 2012 ¹⁹²	Resident local surgeon	Not stated	42									0
El-Gammal, 2015 ¹⁹³	Resident local surgeon	Not stated		18								0

El-Gammal, 2010 ¹⁹⁴	Resident local surgeon	Not stated				7						0
El-Gammal, 2008 ¹⁹⁵	Resident local surgeon	Not stated				13						0
El-Gammal, 2002 ⁴⁹	Resident local surgeon	Not stated				25						0
El-Gammal, 2001 ¹⁹⁶	Resident local surgeon	Not stated										1
El-Gammal, 2002 ¹⁹⁷	Resident local surgeon	Not stated		6								0
El-Gammal, 2004 ¹⁹⁸	Resident local surgeon	Not stated				3						0
El-Marakby, 2009 ¹⁹⁹	Resident local surgeon	Not stated										10
El-Shazly, 2007 ⁵⁴	Resident local surgeon	Not stated		1	1			1	3	5		0
Elsherbiny, 2008 ²⁰⁰	Resident local surgeon	Not stated			10							0
El-Zohairy, 2007 ²⁰¹	Resident local surgeon	Not stated			2							0
Fasika, 1995 ²⁰²	Resident local surgeon	Not stated								1		0
Fejjal, 2013 ²⁰³	Resident local surgeon	Not stated								1		0
Gad, 2015 ²⁰⁴	Resident local surgeon	Not stated	3									0
Galiwango, 2009 ²⁰⁵	Resident local surgeon	Operating Microscope	5		1	6			4	3		0
Gbotolorun, 2016 ²⁰⁶	Resident local surgeon	Not stated			1							0
Ghareeb, 2002 ²⁰⁷	Resident local surgeon	Not stated										2
Ghoneimy, 2018 ²⁰⁸	Resident local surgeon	Not stated				41						0
Giessler, 2012 ²⁰⁹	Visiting surgeons	Loupes	1		1			1				0
Giessler, 2005 ⁶⁴	Visiting surgeons	Loupes	3		3			24		1		0
Graham, 2003 ²¹⁰	Resident local surgeon	Not stated				47						0
Hudson, 1993 ²¹¹	Resident local surgeon	Loupes										6
Liakos, 2019 ²¹²	Resident local surgeon	Not stated										1

Sedira, 2006 ²¹³	Resident local surgeon	Not stated	3					1	5		0
Madaree, 1993 ²¹⁴	Resident local surgeon	Not stated									1
Madaree, 1993 ²¹⁵	Resident local surgeon	Not stated					1				0
Magdy, 2008 ²¹⁶	Resident local surgeon	Not stated			3						0
Meky, 2011 ²¹⁷	Resident local surgeon	Not stated	6								0
Meky, 2015 ¹⁰²	Resident local surgeon	Not stated	12								0
Mofikoya, 2018 ²¹⁸	Resident local surgeon	Not stated									21
Mofikoya, 2014 ²¹⁹	Resident local surgeon	Operating Microscope	7		6				1		1
Nabawi, 2003 ²²⁰	Resident local surgeon	Not stated			7			5			2
Nangole, 2015 ²²¹	Resident local surgeon	Loupes	25	1	48	25		2		19	12
Noaman, 2019 ²²²	Resident local surgeon	Operating Microscope		26					6		0
Noaman, 2007 ²²³	Resident local surgeon	Operating Microscope									7
Noaman, 2013 ²²⁴	Resident local surgeon	Operating Microscope				16					0
Noaman, 2006 ²²⁵	Resident local surgeon	Not stated									25
Noaman, 2002 ²²⁶	Resident local surgeon	Not stated									2
Okoturo, 2017 ²²⁷	Resident local surgeon	Operating Microscope				8					0
Olusoga, 2016 ²²⁸	Resident local surgeon	Not stated	2								0
Oluwatosin, 2000 ²²⁹	Resident local surgeon	Loupes							2		0
Passos, 2015 ²³⁰	Resident local surgeon	Loupes	26		35	36	1				2
Pearce, 2013 ²³¹	Visiting surgeons	Not stated	2			1					0
Rifaat, 2006 ²³²	Resident local surgeon	Not stated			2						0
Rodgers, 2015 ¹³¹	Visiting surgeons	Operating Microscope	5		22			5		1	1

Safoury, 2005 ²³³	Resident local surgeon	Operating Microscope				18						0
Salem, 2009 ²³⁴	Resident local surgeon	Not stated										1
Semaya, 2016 ²³⁵	Resident local surgeon	Not stated				4						0
Shaker, 2003 ²³⁶	Resident local surgeon	Operating Microscope			1						1	3
Shaker, 2016 ²³⁷	Resident local surgeon	Not stated			18							0
Sief, 2010 ²³⁸	Resident local surgeon	Not stated								6		1
Tazi, 2011 ²³⁹	Resident local surgeon	Not stated										1
Tocco-Tussardi, 2016 ²⁴⁰	Visiting surgeons	Operating Microscope	2									0
van der Merwe, 2017 ²⁴¹	Resident local surgeon	Operating Microscope										1
van Lierop, 2007 ²⁴²	Resident local surgeon	Not stated			1							0
Visse, 1976 ²⁴³	Resident local surgeon	Operating Microscope										1
Wamalwa, 2019 ²⁴⁴	Resident local surgeon	Loupes										20

Appendix 13: Reconstructive Microsurgical Procedures Performed (Others)

Reference	Penis Replantation	Penis Transplant	Free TRAM	DIEP	Brachial/Radial /Ulna artery repair	Free iliac crest	Toe to hand	Free groin	Extremity replantation	VLNT	Flap donor site				Not Reported
											Head	Lower Limb	Upper Limb	Trunk	
Abdel Razek, 2014 ¹⁶²						10									
Aboelatta, 2013 ¹⁶⁶			3				2		2						
Amin, 2002 ¹⁷²												3	2		
Badran, 1996 ¹⁸⁰														10	
Bassiouny, 2005 ¹⁸¹			15												
Chait, 1977 ¹⁸²							1								
Citron, 2016 ¹⁴⁴			1	1			1	2			2	2		1	
Daya, 2018 ¹⁸⁷												1			
El-Gammal, 2001 ¹⁹⁶									1						
El-Marakby, 2009 ¹⁹⁹			10												
Ghareeb, 2002 ²⁰⁷												2			
Hudson, 1993 ²¹¹					6										
Liakos, 2019 ²¹²										1					
Madaree, 1993 ²¹⁴													1		
Mofikoya, 2018 ²¹⁸															21
Mofikoya, 2014 ²¹⁹									1						
Nabawi, 2003 ²²⁰			2												
Nangole, 2015 ²²¹										12					
Noaman, 2007 ²²³					7										
Noaman, 2006 ²²⁵					25										
Noaman, 2002 ²²⁶					2										
Passos, 2015 ²³⁰						1						1			
Rodgers, 2015 ¹³¹														1	
Salem, 2009 ²³⁴	1														
Shaker, 2003 ²³⁶	1		1										1		
Sief, 2010 ²³⁸														1	

Tazi, 2011 ²³⁹	1														
van der Merwe, 2017 ²⁴¹		1													
Visse, 1976 ²⁴³								1							
Wamalwa, 2019 ²⁴⁴										20					

Appendix 14: Reconstructive Microsurgical Procedures Performed Subgroup Analysis

Figure: Reconstructive Microsurgical Procedures Performed by Region, Lead Surgeon, Time Period and Method of Magnification

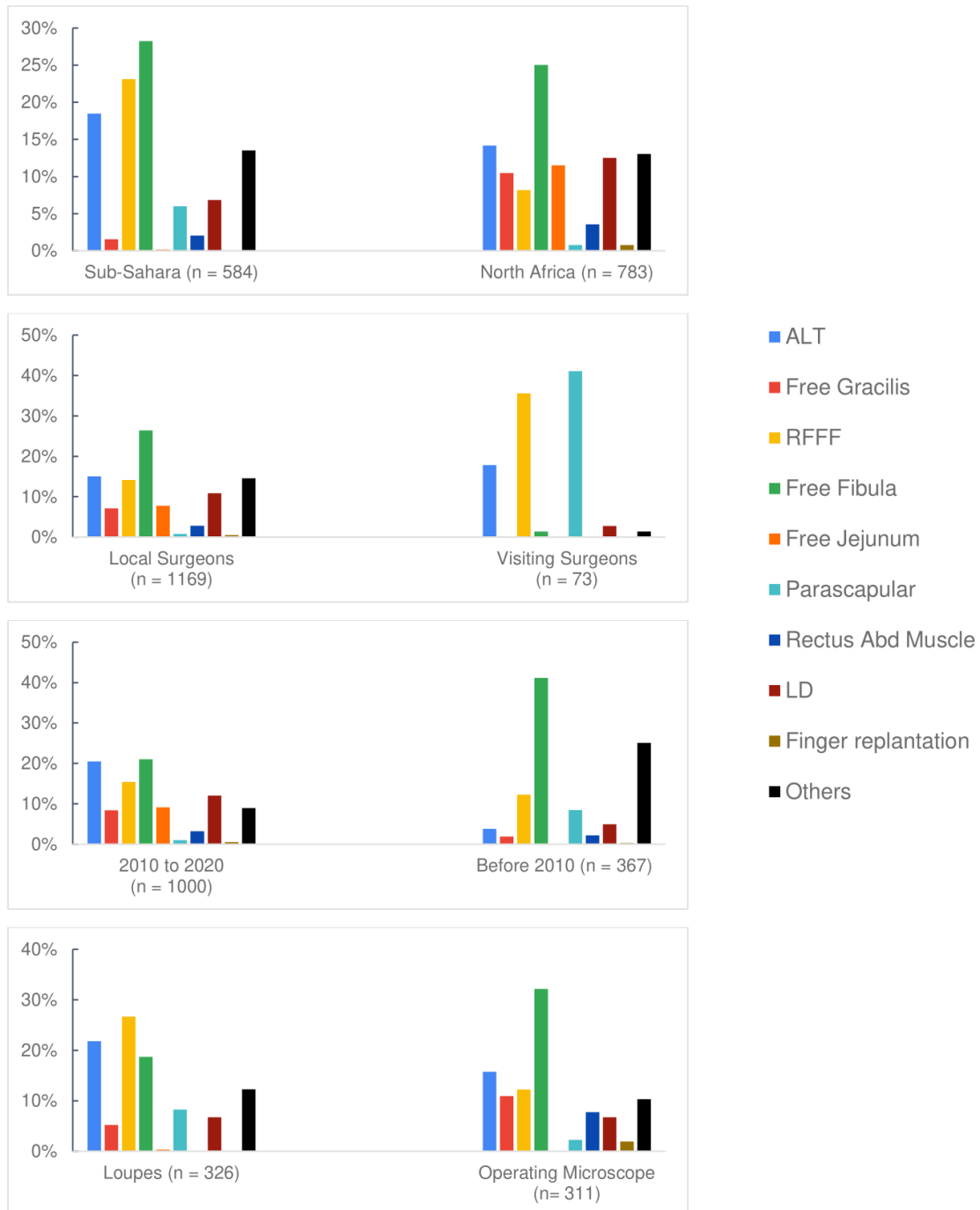


Table: Reconstructive Microsurgical Procedures Performed by Region, Lead Surgeon, Time Period and Method of Magnification

	<i>ALT</i>	<i>Free Gracilis</i>	<i>RFFF</i>	<i>Free Fibula</i>	<i>Free Jejunum</i>	<i>Parascap ular</i>	<i>Rectus Abd Muscle</i>	<i>LD</i>	<i>Finger replant</i>	<i>Others</i>	<i>P Value</i>
<i>Sub-Sahara (n = 584)</i>	108 (18.5%)	9 (1.5%) ***	135 (23.1%) ***	165 (28.3%)	1 (0.2%) ***	35 (6.0%) ***	12 (2.1%) *	40 (6.8%) ***	0 (0.0%) N	79 (13.5%)	<.001
<i>North Africa (n = 783)</i>	111 (14.2%)	82 (10.5%)	64 (8.2%)	196 (25.0%)	90 (11.5%)	6 (0.8%)	28 (3.6%)	98 (12.5%)	6 (0.8%)	102 (13.0%)	
<i>Resident Local Surgeons (n = 1169)</i>	176 (15.1%) ***	83 (7.1%) N	165 (14.1%) ***	309 (26.4%) ***	91 (7.8%) N	9 (0.8%) **	33 (2.8%) N	127 (10.9%) ***	6 (0.5%) N	170 (14.5%) ***	<.001
<i>Visiting Surgeons (n=73)</i>	13 (17.8%)	0 (0.0%)	26 (35.6%)	1 (1.4%)	0 (0.0%)	30 (41.1%)	0 (0.0%)	2 (2.7%)	0 (0.0%)	1 (1.4%)	
<i>2010 to 2020 (n = 1000)</i>	205 (20.5%) ***	84 (8.4%) ***	154 (15.4%) ***	210 (21.0%) **	91 (9.1%) N	10 (1.0%) **	32 (3.2%) ***	120 (12.0%) ***	5 (0.5%)	89 (8.9%)	<.001
<i>Before 2010 (n = 367)</i>	14 (3.8%)	7 (1.9%)	45 (12.3%)	151 (41.1%)	0 (0.0%)	31 (8.4%)	8 (2.2%)	18 (4.9%)	1 (0.3%)	92 (25.1%)	
<i>Loupes (n = 362)</i>	71 (21.8%) *	17 (5.2%) *	87 (26.7%) ***	61 (18.7%) **	1 (0.3%) N	27 (8.3%) **	0 (0.0%) N	22 (6.7%)	0 (0.0%) N	40 (12.3%)	<.001
<i>Operating Microscope (n=311)</i>	49 (15.8%)	34 (10.9%)	38 (12.2%)	100 (32.2%)	0 (0.0%)	7 (2.3%)	24 (7.7%)	21 (6.8%)	6 (1.9%)	32 (10.3%)	

Chi-Square test result: *** $p < .001$, ** $p < .01$, * $p < .05$, N = Not performed

Appendix 15: Reconstructive Microsurgery Outcomes and Complications

Reference	Minimum follow-up duration (months)	Maximum follow-up duration (months)	Average follow-up duration (months)	Failed free flaps	Partial flap loss	Salvage procedures performed	Successful flap salvage	Complications (asides loss of free flap)	Major complications	Minor complications	Deaths
Abbas, 2015 ¹⁶⁰				1	3	3	2	3	1	2	
Abbas, 2012 ¹⁶¹				0	2			2	0	2	
Abdel Razek, 2014 ¹⁶²											
Abdelkader, 2016 ¹⁶³				0		2	2	2			
Abdelrahman, 2016 ¹⁶⁴				1	1			8			
Abir, 2017 ¹⁶⁵			48								
Aboelatta, 2013 ¹⁶⁶	3	60	27	3		3	3	9	1	8	0
Addosooki, 2020 ¹⁶⁷	24	40	30.8	0	1			3	1	2	
Addosooki, 2016 ¹⁶⁸	28	44	35.2	0				5	3	2	
Afifi, 2016 ¹⁶⁹				0							
Akerzoul, 2017 ¹⁷⁰				0				0			
Al Maksoud, 2016 ¹⁷¹	34		34	0	0	0		0			
Amer, 2012 ¹⁵	15	32		0		0		1	1		
Amin, 2002 ¹⁷²	8			1		1	1	11	6	5	
Amin, 2010 ¹⁷³	10		10	0				1	1		
Amr, 2002 ¹⁷⁴				3	14	1	1	13	10		
Amr, 2000 ¹⁷⁵				2	1			6	2	4	
Ayad, 2017 ¹⁷⁶				0	3	2	2	6	0	6	
Ayad, 2017 ¹⁷⁷			6	0	3			1	1		
Ayad, 2019 ¹⁷⁸	6	24		0		1	1	2		2	0
Ayad, 2012 ¹⁷⁹				0				0			
Badran, 1996 ¹⁸⁰	18	48		1	1						
Bassiouny, 2005 ¹⁸¹				2				3	1	2	
Chait, 1977 ¹⁸²	4	4	4	0	0	0		0			
Citron, 2016 ¹⁴⁴				27	2	5	1	40			
Daya, 2009 ¹⁸³				0				0			

Daya, 2009 ¹⁸⁴	6	36		0	1			3		3	
Daya, 2019 ¹⁸⁵				2		2	0				
Daya, 2008 ¹⁸⁶			15	0				0			
Daya, 2018 ¹⁸⁷				0							
Denewer, 2011 ¹⁸⁸				3				3			
Denewer, 2014 ¹⁸⁹				1	3	1	0	6	4	2	
El Fahar, 2018 ¹⁹⁰	34	34	34	0							
Elfeky, 2015 ¹⁹¹			36.7	2				11			1
El-Gammal, 2012 ¹⁹²			42	1	2	3	2				
El-Gammal, 2015 ¹⁹³				1				17			
El-Gammal, 2010 ¹⁹⁴	24	114	65.8								
El-Gammal, 2008 ¹⁹⁵	20.4	87.6	38.4					25	12	13	
El-Gammal, 2002 ⁴⁹	42	120	78	0	0			1	1	0	
El-Gammal, 2001 ¹⁹⁶	23	56	44.67	0				1			
El-Gammal, 2002 ¹⁹⁷	18	36	26	0							
El-Gammal, 2004 ¹⁹⁸	10		10	0							
El-Marakby, 2009 ¹⁹⁹				2	1						
El-Shazly, 2007 ⁵⁴				2							
Elsheerby, 2008 ²⁰⁰	13	38	25	0				3	2	1	
El-Zohairy, 2007 ²⁰¹				0							
Fasika, 1995 ²⁰²				0				0			
Fejjal, 2013 ²⁰³				0	0						
Gad, 2015 ²⁰⁴				1	0			1			
Galiwango, 2009 ²⁰⁵				4		0		3	3		
Gbotolorun, 2016 ²⁰⁶				1							
Ghareeb, 2002 ²⁰⁷				0	0						
Ghoneimy, 2018 ²⁰⁸	12	104	48.7	5				34	15	19	14
Giessler, 2012 ²⁰⁹				3	1	2	1	4		4	
Giessler, 2005 ⁶⁴				0	1			1			
Graham, 2003 ²¹⁰			15	5	0			15	11	4	1
Hudson, 1993 ²¹¹											
Liakos, 2019 ²¹²	6		6					0			
Sedira. 2006 ²¹³				0							

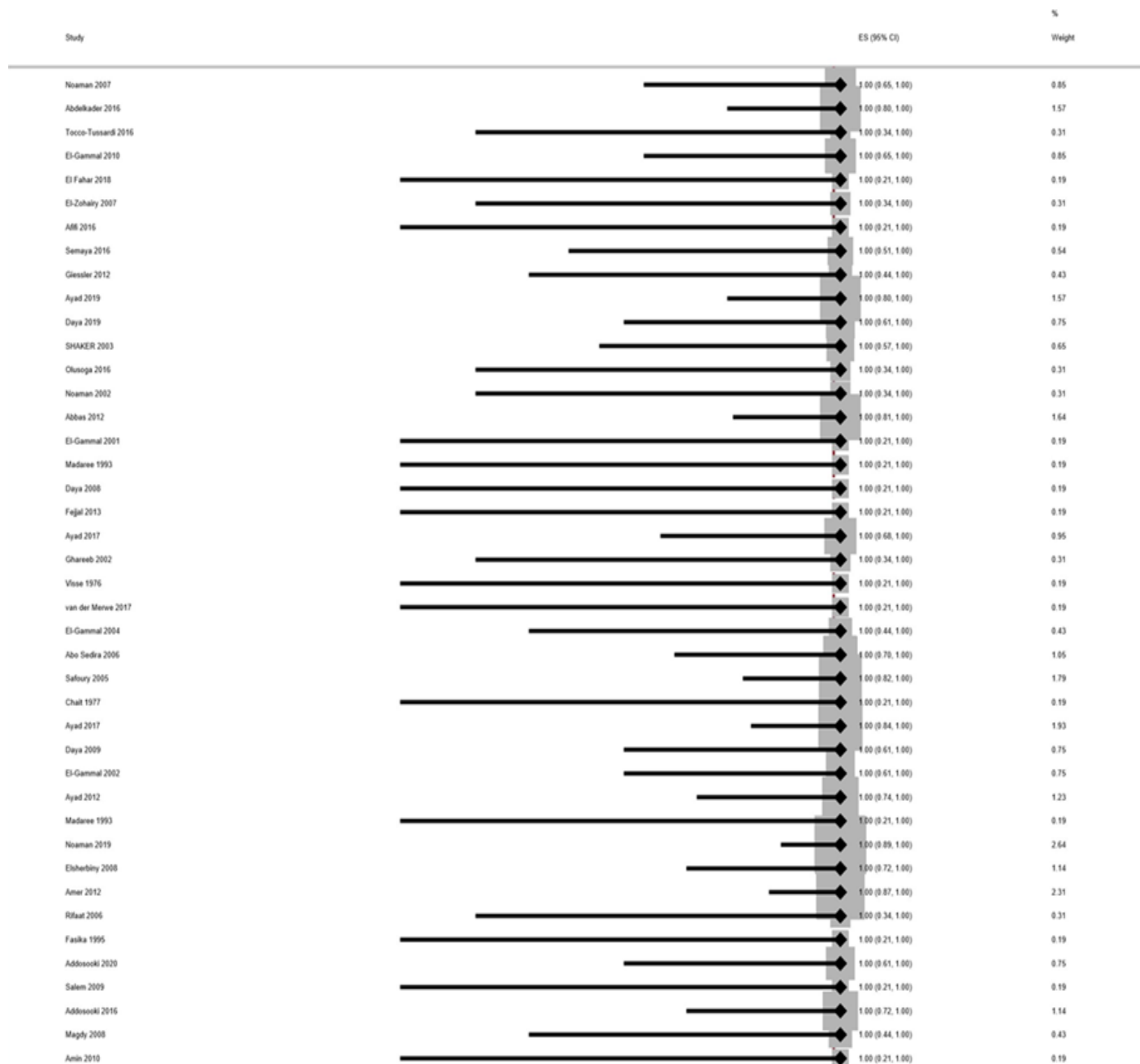
Madaree, 1993 ²¹⁴			24	0				0			
Madaree, 1993 ²¹⁵	36		36	0							
Magdy, 2008 ²¹⁶				0				1		1	
Meky, 2011 ²¹⁷	7	14	10.5	0	1						
Meky, 2015 ¹⁰²				1	2	1	0				
Mofikoya, 2018 ²¹⁸				5		3	1				
Mofikoya, 2014 ²¹⁹	12			5	2	2	1	1			1
Nabawi, 2003 ²²⁰	14	51	27	1		1	0	5			
Nangole, 2015 ²²¹	6			15		8	1	29	3	21	
Noaman, 2019 ²²²			38	0				0			
Noaman, 2007 ²²³											
Noaman, 2013 ²²⁴			84	1		4	4				
Noaman, 2006 ²²⁵				0							
Noaman, 2002 ²²⁶	12		12	0							
Okoturo, 2017 ²²⁷				4				5			2
Olusoga, 2016 ²²⁸				0							
Oluwatosin, 2000 ²²⁹				1		1	0	1			
Passos, 2015 ²³⁰				6	5	7	4	28	13	15	
Pearce, 2013 ²³¹											
Rifaat, 2006 ²³²				0							
Rodgers, 2015 ¹³¹				2	2			13	7	6	
Safoury, 2005 ²³³	24	48	36	0		1	1	2		2	0
Salem, 2009 ²³⁴	2		2	0				0			
Semaya, 2016 ²³⁵				0				4			
Shaker, 2003 ²³⁶	5	30	18	2		3	2	8	2	6	
Shaker, 2016 ²³⁷				0		1	1				
Sief, 2010 ²³⁸			16	1							
Tazi, 2011 ²³⁹	12		12								
Tocco-Tussardi, 2016 ²⁴⁰	2	4	3	0		1	1	0			
van der Merwe, 2017 ²⁴¹	24		24	0	0			0			
van Lierop, 2007 ²⁴²											
Visse, 1976 ²⁴³				0				0			
Wamalwa, 2019 ²⁴⁴	6	29	19.2					0			

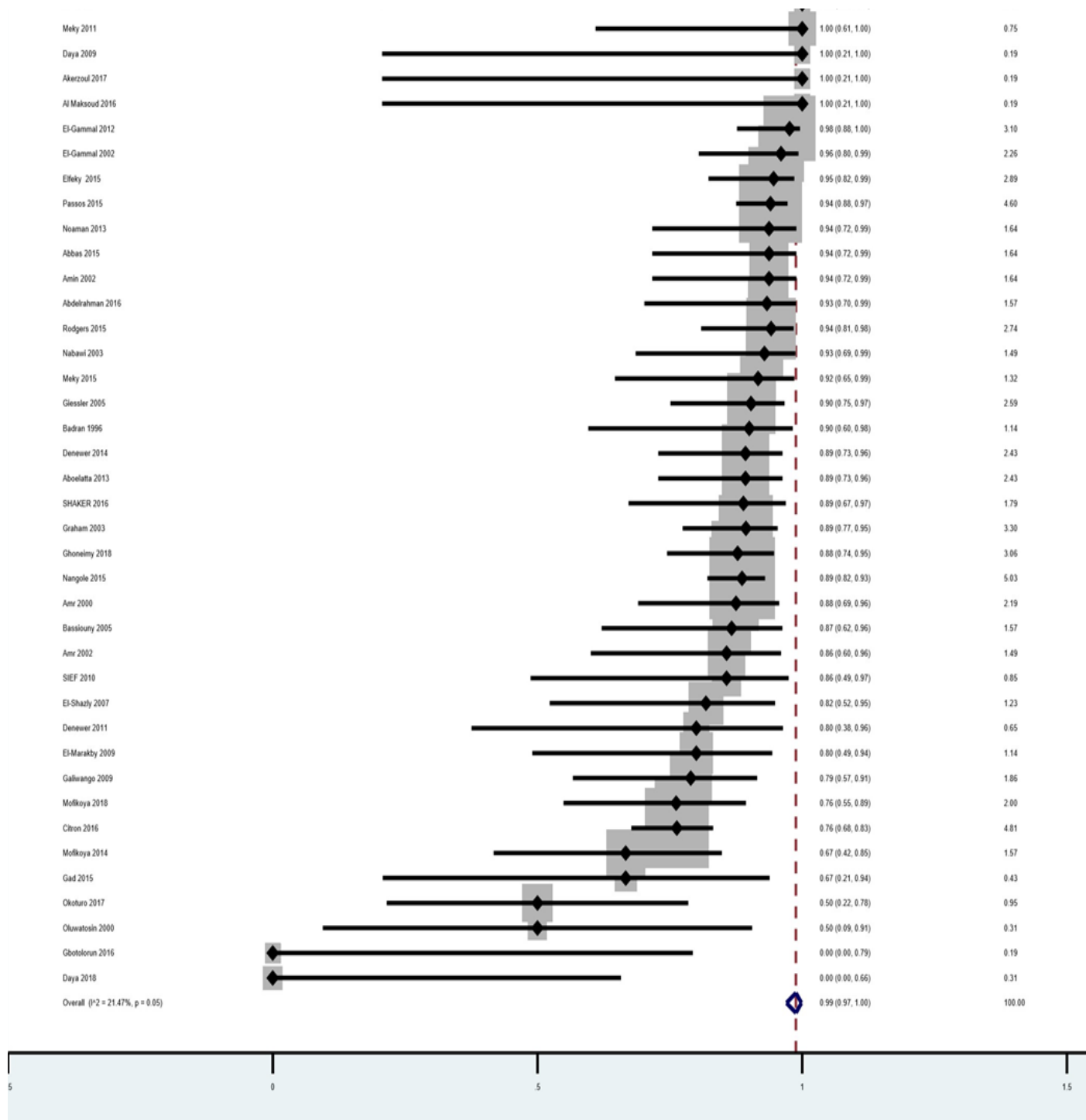
Appendix 16: Sensitivity Analysis

Pooled flap success rate of all studies Vs. Moderate and High GRADE studies

A. Pooled Free Flap Success Rate of All Studies (Very Low, Low, Moderate and High GRADE)

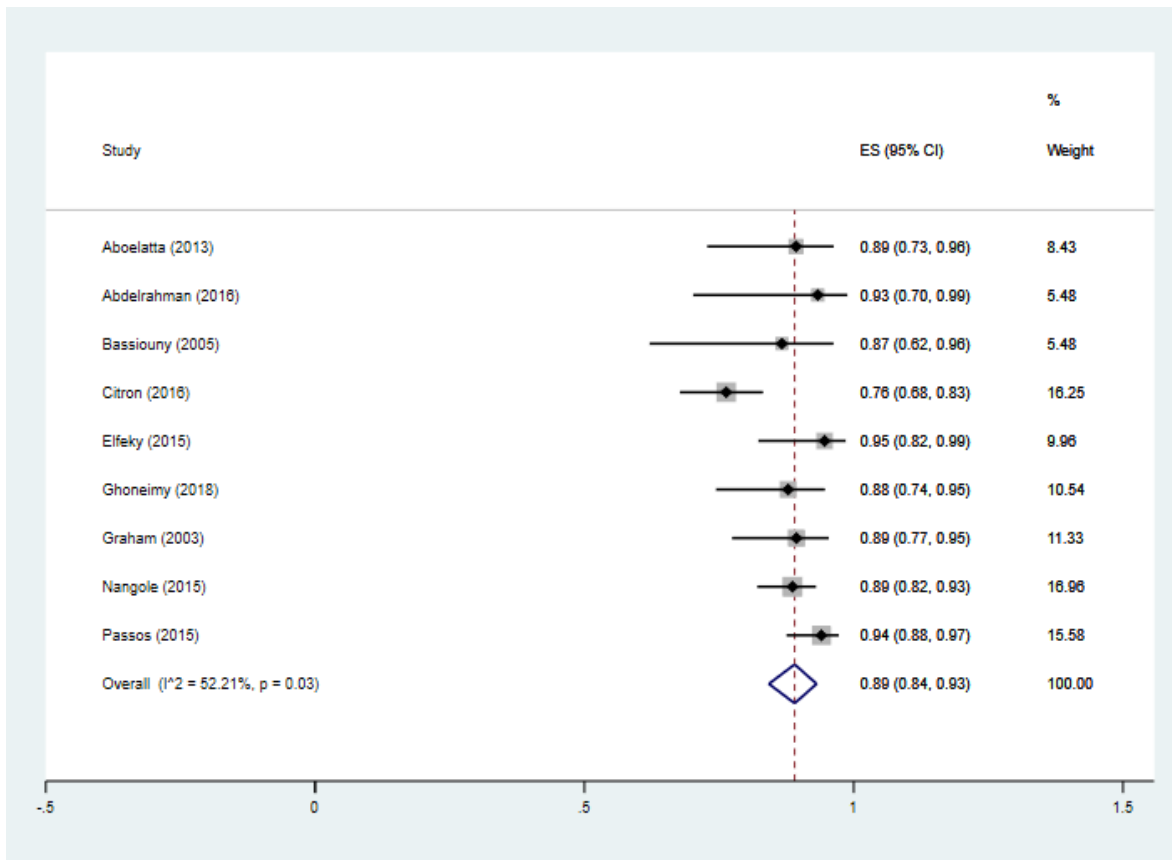
A total of 81 studies out of the 92 studies included reported the outcome of the free flaps performed.





B. Pooled Free Flap Success Rate of only Moderate and High GRADE Studies

A total of 9 studies were graded as Moderate and High GRADE



Appendix 17: Binary Logistic Regression Analysis: Type of Free Flap Vs. Flap Success

. tab Study

Study	Freq.	Percent	Cum.
Abdelrahman	15	2.84	2.84
Aboelatta	28	5.29	8.13
Bassiouny	15	2.84	10.96
Citron	114	21.55	32.51
Elfeky	37	6.99	39.51
Ghoneimy	41	7.75	47.26
Graham	47	8.88	56.14
Nangole	132	24.95	81.10
Passos	100	18.90	100.00
Total	529	100.00	

. tab FlapType, sort

Flap Type	Freq.	Percent	Cum.
Free Fibula flap	191	36.11	36.11
Radial forearm free flap (RFFF)	91	17.20	53.31
Anterolateral thigh flap (ALT)	81	15.31	68.62
Other	56	10.59	79.21
Free Jejunum	38	7.18	86.39
Latismus Dorsi flap (LD)	29	5.48	91.87
Free Gracilis Flap	24	4.54	96.41
TRAM	19	3.59	100.00
Total	529	100.00	

. tab Flap_type, sort

Flap_type	Freq.	Percent	Cum.
Free Fibula flap	191	36.11	36.11
RFFF	91	17.20	53.31
ATF	81	15.31	68.62
Others	56	10.59	79.21
Free Jejunum	38	7.18	86.39
Latismus dorsi flap	29	5.48	91.87
Free Gracilic	24	4.54	96.41
TRAM	19	3.59	100.00
Total	529	100.00	

. tab ResultSuccess0Fail1

Result (Success = 0, Fail = 1)	Freq.	Percent	Cum.
0	463	87.52	87.52
1	66	12.48	100.00
Total	529	100.00	

. tab Flap_type ResultSuccess0Fail1, row

```
. xtmelogit ResultSuccess0Fail1 i.Flap_type || Study:, or
```

Refining starting values:

```
Iteration 0: log likelihood = -196.49308 (not concave)
Iteration 1: log likelihood = -194.12865
Iteration 2: log likelihood = -193.6698
```

Performing gradient-based optimization:

```
Iteration 0: log likelihood = -193.6698
Iteration 1: log likelihood = -193.50613
Iteration 2: log likelihood = -193.50518
Iteration 3: log likelihood = -193.50518
```

```
Mixed-effects logistic regression      Number of obs      =      529
Group variable: Study                 Number of groups   =        9
```

```
Obs per group:
      min =      15
      avg =     58.8
      max =     132
```

```
Integration points =      7      Wald chi2(7)      =      5.00
Log likelihood = -193.50518      Prob > chi2      =      0.6603
```

ResultSuccess0Fail1	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]	
Flap_type						
RFFF	1.010071	.4609741	0.02	0.982	.4129357	2.470708
ATF	1.410722	.5680095	0.85	0.393	.6407901	3.105754
Free Jejunum	.4699074	.4124903	-0.86	0.390	.0841041	2.62547
Others	.9999187	.4958555	-0.00	1.000	.3783183	2.642847
Latismus dorsi flap	1.120884	.6848694	0.19	0.852	.3384302	3.712375
Free Gracilic	2.726123	1.60692	1.70	0.089	.8586233	8.655423
TRAM	1.601966	1.215844	0.62	0.535	.3619236	7.090711
_cons	.1123255	.0337296	-7.28	0.000	.0623557	.2023395

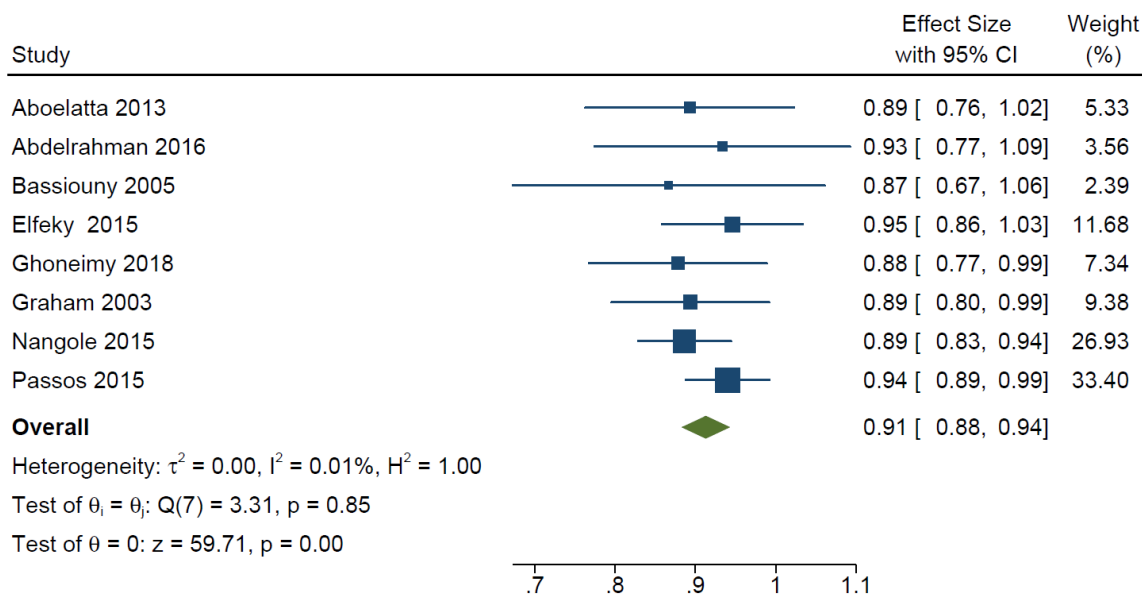
Note: _cons estimates baseline odds (conditional on zero random effects).

Random-effects Parameters	Estimate	Std. Err.	[95% Conf. Interval]	
Study: Identity				
sd(_cons)	.3961789	.1844784	.1590502	.9868439

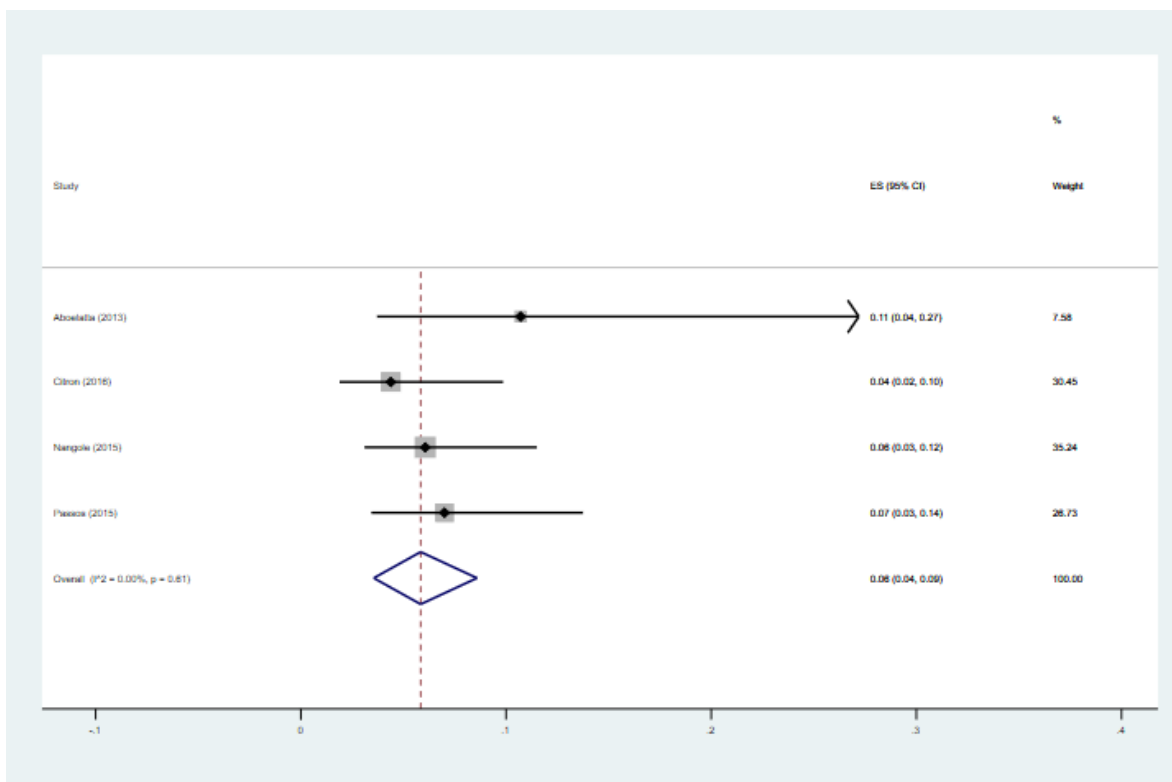
LR test vs. logistic model: chibar2(01) = 4.23 Prob >= chibar2 = 0.0198

Appendix 18: Additional Forest Plots

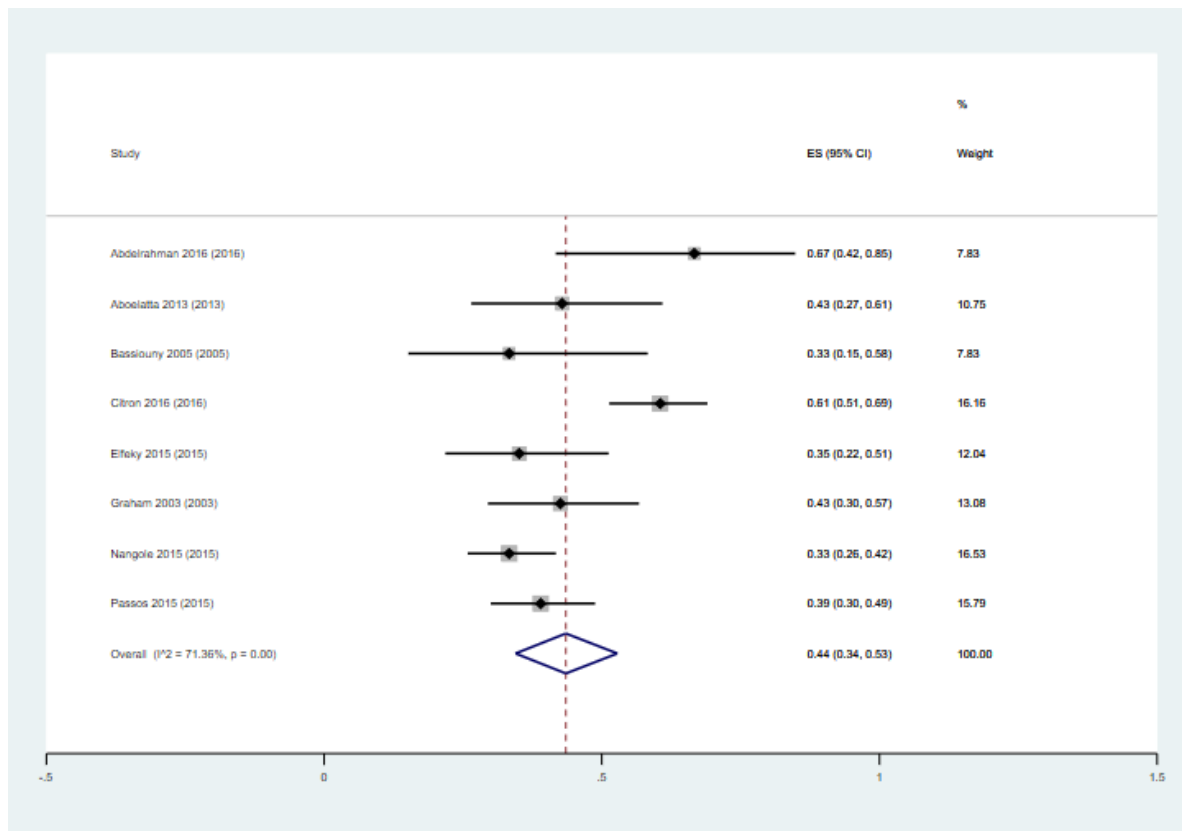
A. Pooled Flap Success Rate without Citron (2016)



B. Pooled Rate of Attempted Free Flap Salvage Procedures



C. Pooled Total Complication Rate without Ghoneimy (2018)



References

1. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *The BMJ*. 2021;372. doi:10.1136/bmj.n71
2. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: A proposal for reporting. *Journal of the American Medical Association*. 2000;283(15):2008-2012. doi:10.1001/jama.283.15.2008
3. ABULEZZ T, HIFNY MA, YUZURU K, SAIED S, MANSOUR KABBASH MD. Clinical and Functional Outcomes of Three-Dimensional Free Anterolateral Thigh (ALT) Flap in Oropharyngeal Reconstruction. *Egypt, J Plast Reconstr Surg*. 2017;41(1):131-137.
4. Accorona R, Fazio E, Awny S, Calabrese L. Single-Skin Paddle Anterolateral Thigh Free Flap with Ileotibial Tract for Internal Lining in Reconstruction of Full-Thickness Cheek Defect. *Journal of maxillofacial and oral surgery*. 2020;19(1):157-158. doi:10.1007/s12663-019-01229-6
5. Adams-Ray WE, James JH. Cancrum oris: functional and cosmetic reconstruction in patients with ankylosis of the jaws. *British journal of plastic surgery*. 1992;45(3):193-198. doi:10.1016/0007-1226(92)90075-9
6. Adekeye EO, Ord RA. Cancrum oris: principles of management and reconstructive surgery. *Journal of maxillofacial surgery*. 1983;11(4):160-170. doi:10.1016/s0301-0503(83)80040-x
7. Ahmed A, Mbibu NH. Aetiology and management of injuries to male external genitalia in Nigeria. *Injury*. 2008;39(1):128-133.
8. Akiode O, Shonubi AMO, Musa A, et al. Major limb amputations: an audit of indications in a suburban surgical practice. *Journal of the National Medical Association*. 2005;97(1):74-78. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed9&NEWS=N&AN=40139821>
9. al Maksoud A, Moneer M, Barsoum AK, et al. Combined TRAM flap with latissimus dorsi myocutaneous flap for reconstruction of a large breast post-radiation induced necrosis. *Journal of Surgical Case Reports*. 2017;2017(5):rjx079. doi:10.1093/jscr/rjx079
10. Aladelusi TO, Ogunkeyede SA, Akinmoladun VI. Maxillectomy: Indications and outcome at a tertiary hospital in Nigeria—A review of 113 cases. *Archives of International Surgery*. 2018;8(1):32.
11. Alfeky H, McArthur P, Helmy Y. Salvaging Digital Replantation and Revascularisation: Efficiency of Heparin Solution Subcutaneous Injection. *Surgery research and practice*. 2018;2018:1601738. doi:10.1155/2018/1601738

12. Alonge TO, Ogunlade SO, Omololu AB. The Belfast technique for the treatment of chronic osteomyelitis in a tropical teaching hospital. *International Orthopaedics*. 2003;27(2):125-128. doi:10.1007/s00264-002-0416-7
13. Al-Refaie RE, Amer S, Ismail MF, Al-Shabrawy M, Al-Gamal G, Mokbel E. Chondrosarcoma of the chest wall: single-center experience. *Asian cardiovascular & thoracic annals*. 2014;22(7):829-834. doi:10.1177/0218492314522470
14. Amer TA. A single hypoglossal nerve for bilateral smile reconstruction in Möbius syndrome. *The Journal of craniofacial surgery*. 2010;21(6):1926-1927. doi:10.1097/SCS.0b013e3181f4edb2
15. Amer TA. The split hypoglossal nerve to supply the free functional muscle transfer in facial reanimation. *European Journal of Plastic Surgery*. 2013;36(3):155-164. doi:10.1007/s00238-012-0782-3
16. Amer TA, el Kholy MS, Khalaf AA, Rifky AM. Amer's classification of territories of facial nerve injury in early cases and strategies for the management of different territories. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. Published online June 13, 2020. doi:10.1016/j.bjps.2020.05.100
17. Amin A, Rifaat M, Civantos F, Weed D, Abu-Sedira M, Bassiouny M. Free anterolateral thigh flap for reconstruction of major craniofacial defects. *Journal of reconstructive microsurgery*. 2006;22(2):97-104. doi:10.1055/s-2006-932503
18. Amole O, Osunde O, Akhiwu B, et al. A 14-Year Review of Craniomaxillofacial Gunshot Wounds in a Resource-Limited Setting. *Craniomaxillofacial trauma & reconstruction*. 2017;10(2):130-137. doi:10.1055/s-0037-1601341
19. Astini C, Severoni S. Ureteral reconstruction using the vermiform appendix flap in a patient with a post traumatic uretero cutaneous fistula. *Tropical doctor*. 1997;27(1):47-48. doi:10.1177/004947559702700118
20. Asuku ME, Ibrahim A, Ijekeye FO. Post-burn axillary contractures in pediatric patients: a retrospective survey of management and outcome. *Burns : journal of the International Society for Burn Injuries*. 2008;34(8):1190-1195. doi:10.1016/j.burns.2008.04.006
21. Atmodiwirjo P, Sandhi A. Sole Reconstruction Using Anterolateral Thigh Free Flap: A Review of 4 Cases. *Jurnal Plastik Rekonstruksi*. 2013;2(3).
22. Barbier O, Ollat D, Pasquier P, Rigal S, Versier G. Could the orthopaedic surgeon deployed in austere setting perform flaps on the leg? *Acta orthopaedica Belgica*. 2017;83(1):35-39. <http://www.ncbi.nlm.nih.gov/pubmed/29322892>

23. Bertrand B, Honeyman CS, Emparanza A, et al. Twenty-Five Years of Experience with the Submental Flap in Facial Reconstruction. *Plastic and Reconstructive Surgery*. 2019;143(6):1747-1758. doi:10.1097/PRS.00000000000005678
24. Biswas A, Samadoni A el, Elbassiouny A, Sobh K, Hegazy A. Extracranial to intracranial bypass anastomosis: Review of our preliminary experience from a low volume center in Egypt. *Asian journal of neurosurgery*. 2015;10(4):303-309. doi:10.4103/1793-5482.162711
25. Carr MM, Manktelow RT, Zuker RM. Gracilis donor site morbidity. *Microsurgery*. 1995;16(9):598-600. doi:10.1002/micr.1920160904
26. Chabak H, Rafik A, Ezzoubi M, Diouri M, Bahechar N, Chlihi A. Reconstruction of scrotal and perineal defects in Fournier's gangrene. *Modern Plastic Surgery*. 2015;5(03):23.
27. Charpentier A, Lemperle G. Simultaneous total upper and lower lip reconstruction during a humanitarian surgical mission to Africa. *European Journal of Plastic Surgery*. 2017;40(1):79-82.
28. Chattar-Cora D, Perez-Nieves R, McKinlay A, Kunasz M, Lyons RC. Free tissue transfer at an army medical center. *European Journal of Plastic Surgery*. 2007;29(5):221-226.
29. Chekkoury-Idrissi A, Chekkoury-Idrissi H, Ouazzani H. [Reconstructive surgery in giant cancers of the lips: our experience at the Casablanca University Hospital Center. Apropos of 62 cases]. *Annales de chirurgie plastique et esthetique*. 1987;32(1):21-28.
30. Chidzonga MM, Mahomva L. Noma (cancrum oris) in human immunodeficiency virus infection and acquired immunodeficiency syndrome (HIV and AIDS): clinical experience in Zimbabwe. *Journal of oral and maxillofacial surgery*. 2008;66(3):475-485.
31. Chidzonga MM, Mahomva L. Recurrent Noma (Cancrum Oris) in Human Immunodeficiency Virus Infection and Acquired Immunodeficiency Syndrome (HIV and AIDS): Report of a Case. *Journal of Oral and Maxillofacial Surgery*. 2008;66(8):1726-1730. doi:10.1016/j.joms.2007.08.012
32. Classen DA, Irvine L. Free muscle flap transfer as a lymphatic bridge for upper extremity lymphedema. *Journal of reconstructive microsurgery*. 2005;21(2):93-99. doi:10.1055/s-2005-864841
33. Cronjé HS, van Zyl JS. Resurfacing the vulva and vagina. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*. 1988;27(1):113-118. doi:10.1016/0020-7292(88)90098-7
34. Datli A, Karasoy I, Genc Y, Pilanci O. Challenges of Setting up a Lower Extremity Reconstruction Practice in a Constrained Environment. *Journal of Reconstructive Microsurgery*. Published online 2020.

35. de P Djientcheu V, Njamnshi AK, Ongolo-Zogo P, et al. Growing skull fractures. *Child's nervous system : ChNS : official journal of the International Society for Pediatric Neurosurgery*. 2006;22(7):721-725. doi:10.1007/s00381-005-0010-6
36. Degiannis E, Levy RD, Potokar T, Saadia R. Penetrating injuries of the axillary artery. *The Australian and New Zealand journal of surgery*. 1995;65(5):327-330. doi:10.1111/j.1445-2197.1995.tb00647.x
37. del Bene M, Amadei F, Petrolati M, Vittorio Rovati L, Confalonieri PL, Pietro Caronni E. Radial forearm fasciocutaneous free flap as a solution in case of noma. *Microsurgery: Official Journal of the International Microsurgical Society and the European Federation of Societies for Microsurgery*. 1999;19(1):3-6.
38. Denewer AD, Setit AE, Hussein OA, Aly OF. Functional and aesthetic outcome of reconstruction of large oro-facial defects involving the lip after tumor resection. *Journal of the Egyptian National Cancer Institute*. 2006;18(1):61-66.
39. S. D, D. A, A. G, D.K. V, J. A. Surgical outcomes of 63 patients from an international trial of preoperative concurrent paclitaxel- Radiation in locally advanced breast cancer. *Annals of Surgical Oncology*. 2011;18(S2):145-185. doi:10.1245/s10434-011-1680-9
40. Djor MBD, Houda K, Allaye G, Lahimiti S, Fawzi S, Hattab MN. Surgical Approaches in the Repair of Laterofacial Loss. *International Journal of Clinical Oral and Maxillofacial Surgery*. 2019;5(2):37.
41. Drummond G, Scott P, Mackay D, Lipschitz R. Separation of the Baragwanath craniopagus twins. *British journal of plastic surgery*. 1991;44(1):49-52. doi:10.1016/0007-1226(91)90178-m
42. Ebeid WA, Abo-Senna WG, Hasan BZ, Badr IT, Mesregah MK. Functional and oncological outcomes of limb-salvage surgery for foot and ankle tumors. *Foot (Edinburgh, Scotland)*. 2019;41:34-38. doi:10.1016/j.foot.2019.06.007
43. el Danaf A, Abou Elseoud A, Alhussein T, Fansa M. Venous drainage through marrow coaptation in free bone transfer: two case reports. *Journal of reconstructive microsurgery*. 1986;2(03):165-167.
44. M. El, A. E, M. S. Digital replantation, results and complications: Study of a series of 18 cases. *Pan African Medical Journal*. 2016;24:184. doi:http://dx.doi.org/10.11604/pamj.2016.24.184.8718
45. el Mofty A, Amin SN, Ebeid A. Microsurgery by Pedicled Scapular Crest Bone Graft for Shoulder Reconstruction. *Journal of Reconstructive Microsurgery*. 2006;22(03):A112.
46. Elbashir AM, Yagi KI. Case Report Reconstruction of a large cheek defect caused by cancrum oris (noma). *Sudan Med J*. 2012;48(1).

47. Elfeki B, Chang LS, Kang BK, Eun S. Dural Reconstruction Using Laparoscopic Gastro-omental Free Flap in Refractory Cranial Infections. *Annals of plastic surgery*. 2020;84(1):62-67. doi:10.1097/SAP.0000000000001970
48. El-Gammal TA, El-Sayed A, Kotb MM. Hypertrophy after free vascularized fibular transfer to the lower limb. *Microsurgery*. 2002;22(8):367-370. doi:10.1002/micr.10066
49. El-Gammal TA, El-Sayed A, Kotb MM, et al. Microsurgical reconstruction of lower limb bone defects following tumor resection using vascularized fibula osteoseptocutaneous flap. *Microsurgery: Official Journal of the International Microsurgical Society and the European Federation of Societies for Microsurgery*. 2002;22(5):193-198. doi:10.1002/micr.22501
50. Elghoneimy M, Abdel Rassoul M, Salam K, Yehia A, Gammal M. 366 Phallic Reconstruction Using Radial Forearm Free Flap: The Cairo University Experience. *Journal of Sexual Medicine*. 2017;14(1s):S107-S107. <http://10.0.3.248/j.jsxm.2016.11.248>
51. Elmaraghi S, Chen TJ, Heckman JE, et al. Functional penile replantation after traumatic avulsion amputation below the pubis: A case report. *Microsurgery*. 2020;40(1):70-73. doi:10.1002/micr.30425
52. El-Shazly M, Chao HW, Cheng M-H, Chen H-C. Advancement of the endoscopic assisted microsurgery: a clinical experience. *European Journal of Plastic Surgery*. 2005;28(4):272-275.
53. El-Shazly M, Yassin O, Kamal A, Makboul M, Gherardini G. Soft tissue defects of the heel: a surgical reconstruction algorithm based on a retrospective cohort study. *The Journal of foot and ankle surgery : official publication of the American College of Foot and Ankle Surgeons*. 2008;47(2):145-152. doi:10.1053/j.jfas.2007.12.010
54. El-Shazly M, Makboul M. Microsurgical free tissue transfer as a valuable reconstructive procedure in foot reconstruction. *INDIAN JOURNAL OF PLASTIC SURGERY*. 2007;Vol. 40(No. 2):141-146. Accessed April 28, 2021. www.medknow.com
55. El-Sherbiny M. Long term behavior of pedicled vascularized fibular grafts in reconstruction of middle and distal tibia after resection of malignant bone tumors. *Journal of the Egyptian National Cancer Institute*. 2008;20(2):187-195.
56. Enwonwu CO, Falkler WA, Phillips RS. Noma (cancrum oris). *Lancet (London, England)*. 2006;368(9530):147-156. doi:10.1016/S0140-6736(06)69004-1
57. Fagan JJ, Otiti J, Aswani J, et al. African head and neck fellowships: A model for a sustainable impact on head and neck cancer care in developing countries. *Head & neck*. 2019;41(6):1824-1829.

58. Fagan JJ, Zafereo M, Aswani J, Netterville JL, Koch W. Head and neck surgical subspecialty training in Africa: sustainable models to improve cancer care in developing countries. *Head & neck*. 2017;39(3):605-611.
59. Falcone M, Garaffa G, Raheem A, Christopher NA, Ralph DJ. Total Phallic Reconstruction Using the Radial Artery Based Forearm Free Flap After Traumatic Penile Amputation. *The journal of sexual medicine*. 2016;13(7):1119-1124. doi:10.1016/j.jsxm.2016.05.003
60. Fernandes N, van den Heever J, Hoek K, et al. Customized reconstruction of an extensive mandibular defect: A clinical report. *The Journal of prosthetic dentistry*. 2016;116(6):928-931.
61. Foehn M, Bannasch H, Stark GB, et al. Single step fibula-pro-tibia transfer and soft tissue coverage with free myocutaneous latissimus dorsi flap after extensive osteomyelitis and soft tissue necrosis - a 3 year follow up. *JOURNAL OF PLASTIC RECONSTRUCTIVE AND AESTHETIC SURGERY*. 2009;62(11):E466-E470. doi:10.1016/j.bjps.2008.03.059
62. García-Sánchez JM, Ibáñez Beltrán L, Simón-Sanz E, et al. Reconstruction Department. Management of Hand Burn With Pedicled Converted Anterolateral Thigh Free Flap. *Plastic Surgical Nursing*. 2019;39(1):14-17. doi:10.1097/PSN.0000000000000254
63. Giessler GA, Schmidt AB. Noma: experiences with a microvascular approach under West African conditions. *Plastic and reconstructive surgery*. 2003;112(4):946-947. doi:10.1097/01.PRS.0000076217.58995.E2
64. G.A. G, A. F, C.-P. C. Microsurgical reconstruction of noma-related facial defects with folded free flaps: An overview of 31 cases. *Annals of Plastic Surgery*. 2005;55(2):132-138. doi:http://dx.doi.org/10.1097/01.sap.0000165688.50780.e9
65. Giessler GA, Schmidt AB, Deubel U, Cornelius C-P. Free flap transfer for closure and interposition-arthroplasty in noma defects of the lateral face associated with bony ankylosis. *The Journal of craniofacial surgery*. 2004;15(5):766-772; discussion 773. doi:10.1097/00001665-200409000-00013
66. Giessler GA, Cornelius CP, Suominen S, et al. Primary and secondary procedures in functional and aesthetic reconstruction of noma-associated complex central facial defects. *Plastic and Reconstructive Surgery*. 2007;120(1):134-143. doi:10.1097/01.prs.0000263657.49956.8d
67. Graham RG, Omotoso PO, Hudson DA. The effectiveness of muscle flaps for the treatment of prosthetic graft sepsis. *Plastic and reconstructive surgery*. 2002;109(1):105-108. doi:10.1097/00006534-200201000-00018
68. Grotepass FW, Booysen JT, Nortjé CJ, Farman AG. Treatment of large oro-nasal fistulae using a triple-layer technique: 38 cases. *The British journal of oral & maxillofacial surgery*. 1990;28(4):222-227. doi:10.1016/0266-4356(90)90056-q

69. Hammer RR, Rösser B, Lidman D, Smeds S. Simplified external fixation for primary management of severe musculoskeletal injuries under war and peace time conditions. *Journal of orthopaedic trauma*. 1996;10(8):545-554. doi:10.1097/00005131-199611000-00007
70. Hamouya A, Barbato B, Beauthier-Landauer V, Hémon C. Complete ring finger avulsion: Review of 16 years of cases at a Hand Emergency Unit. *Hand Surgery and Rehabilitation*. 2018;37(4):206-211. doi:10.1016/j.hansur.2018.03.003
71. Hamza F, Yousif J, Kotti B. La reconstruction mammaire par TRAM libre en chirurgie libérale : à propos de 20 cas consécutifs. *Breast reconstruction using the free TRAM flap in a private practice setting A review of 20 cases*. 2010;55(6):524-530. <http://10.0.3.248/j.anplas.2009.11.010>
72. Hashikawa K, Tahara S, Ishida H, et al. Simple reconstruction with titanium mesh and radial forearm flap after globe-sparing total maxillectomy: a 5-year follow-up study. *Plastic and reconstructive surgery*. 2006;117(3):963-967. doi:10.1097/01.prs.0000200623.91956.66
73. Hadj Hassine Y, Hmid M, Baya W. Trauma of the hand from circular saw table: a series of a 130 cases. *La Tunisie medicale*. 2016;94(12):851.
74. Helmy Ali Y, Farahat Mohamed A, Nasef MA, et al. Facial skin cancer reconstructive and cosmetic outcomes: Analysis with algorithm for its management. *JOURNAL OF COSMETIC DERMATOLOGY*. 2020;19(5):1182-1190. doi:10.1111/jocd.13121
75. Holle J, Kubiena H, Issa OH. Distraction Therapy to Correct Trismus Following Noma. *Journal of Craniofacial Surgery*. 2020;31(2):488-491. doi:10.1097/SCS.00000000000006082
76. K.A. H, B. F, D.H. L, O. O-D, P. A, P.E. H-W. Creating an Outpatient, Local Anesthetic Hand Operating Room in a Resource-Constrained Ghanaian Hospital Builds Surgical Capacity and Financial Stability. *Annals of plastic surgery*. 2020;84(4):385-389. doi:<http://dx.doi.org/10.1097/SAP.00000000000002196>
77. Houdek MT, Wagner ER, Watts CD, Sems SA, Moran SL. Free Composite Serratus Anterior-Latissimus-Rib Flaps for Acute One-Stage Reconstruction of Gustilo IIIB Tibia Fractures. *The American Journal of Orthopedics*. 2018;47(6). doi:10.12788/ajo.2018.0047
78. Hsu JR, Beltran MJ, (STReC) STRC. Shortening and angulation for soft-tissue reconstruction of extremity wounds in a combat support hospital. *Military medicine*. 2009;174(8):838-842.
79. Hudson DA. Aesthetic modification for delayed autologous breast reconstruction: using a thoracodorsal flap to create a breast pocket. *Annals of plastic surgery*. 2001;47(6):589-593. doi:10.1097/00000637-200112000-00001
80. Hudson DA, Skoll PJ. Single-stage, autologous breast restoration. *Plastic and reconstructive surgery*. 2001;108(5):1163. doi:10.1097/00006534-200110000-00009

81. Huijing MA, Marck KW, Combes J, et al. Facial reconstruction in the developing world: a complicated matter. *British Journal of Oral and Maxillofacial Surgery*. 2011;49(4):292-296. doi:10.1016/J.BJOMS.2009.08.044
82. Innocenti M, Abed YY, Beltrami G, Delcroix L, Balatri A, Capanna R. Quadriceps muscle reconstruction with free functioning latissimus dorsi muscle flap after oncological resection. *Microsurgery: Official Journal of the International Microsurgical Society and the European Federation of Societies for Microsurgery*. 2009;29(3):189-198.
83. Jeannon J-P, Orabi A, McGurk M, Ng R, Roblin P, Simo R. Reconstruction of segmental hemi-mandibular defects using soft tissue flaps in patients with severe comorbidity and advanced head and neck cancer. *Journal of the Egyptian National Cancer Institute*. 2008;20(4):342-347.
84. Jiang C, Guo F, Li N, Huang P, Jian X, Munnee K. Tripaddled anterolateral thigh flap for simultaneous reconstruction of bilateral buccal defects after buccal cancer ablation and severe oral submucous fibrosis release: a case report. *Microsurgery*. 2013;33(8):667-671. doi:10.1002/micr.22140
85. Jorgenson DS, Antoine GA. Advances in the treatment of lower extremity wounds applied to military casualties. *Annals of plastic surgery*. 1995;34(3):293-298. doi:10.1097/0000637-199503000-00013
86. Kalavrezos N, Baldwin DJ, Walker DM. Giant neglected ameloblastoma: single stage treatment and clinicopathological review. *BRITISH JOURNAL OF ORAL & MAXILLOFACIAL SURGERY*. 2008;46(7):591-593. doi:10.1016/j.bjoms.2008.02.001
87. Khalil E-SA, El-Zohairy MA, Bukhari M. Reconstruction of large full thickness chest wall defects following resection of malignant tumors. *Journal of the Egyptian National Cancer Institute*. 2010;22(1):19-27.
88. Khalil HH, Kalkat M, Malahias MN, et al. Impact of Surgically and Radiologically Detected Incidental Internal Mammary Lymph Node Enlargement in Breast Cancer Patients Undergoing Free-Flap Breast Reconstruction. *Journal of Reconstructive Microsurgery Open*. 2018;3(01):e32-e40.
89. KIND GM, FELLOW SM, SCHREIBER JS. Microvascular Replantation of Scalp and Facial Parts. *Surgical Technology International*. 1995;4:400-408.
90. Lazarus D, Hudson DA. A Simple Method for Determining the Weight of the TRAM Flap Intraoperatively at the Time of Breast Reconstruction. *Plastic and Reconstructive Surgery*. 2001;107(3):818-819. doi:10.1097/00006534-200103000-00025
91. Lekuya HM, Alenyo R, Kajja I, et al. Degloving injuries with versus without underlying fracture in a sub-Saharan African tertiary hospital: a prospective observational study.

JOURNAL OF ORTHOPAEDIC SURGERY AND RESEARCH. 2018;13. doi:10.1186/s13018-017-0706-9

92. Leonetti JP, Zender CA, Vandevender D, Marzo SJ. Long-term results of microvascular free-tissue transfer reanimation of the paralyzed face: Three cases. *Ear, Nose & Throat Journal*. 2008;87(4):226-233.
93. Marck KW, de Bruijn HP, Schmid F, Meixner J, van Wijhe M, van Poppelen RHM. Noma: the Sokoto approach. *EUROPEAN JOURNAL OF PLASTIC SURGERY*. 1998;21(6):277-280. doi:10.1007/s002380050094
94. Marck KW, de Bruijn HP. Surgical treatment of noma. *Oral diseases*. 1999;5(2):167-171. doi:10.1111/j.1601-0825.1999.tb00084.x
95. Mathieu L, Mottier F, Bertani A, Danis J, Rongieras F, Chauvin F. Management of neglected open extremity fractures in low-resource settings: Experience of the French Army Medical Service in Chad. *ORTHOPAEDICS & TRAUMATOLOGY-SURGERY & RESEARCH*. 2014;100(7):815-820. doi:10.1016/j.otsr.2014.06.017
96. Mathieu L, Ghabi A, Amar S, Murison J-C, Boddaert G, Levadoux M. The state of microsurgical practice in French forward surgical facilities from 2003 to 2015. *Hand Surgery and Rehabilitation*. 2019;38(6):358-363.
97. Mathieu L, Levadoux M, Landevoisin ES de, Windsor TJM, Rigal S. Digital replantation in forward surgical units: a cases study. *SICOT-J*. 2018;4:9. doi:10.1051/sicotj/2018004
98. Mauramati S, Morbini P, Ferrario G, et al. Morphological analysis of ischemia-reperfusion injury in a cold ischemia model of jejunal free flap for hypopharyngeal reconstruction. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. 2020;73(1):103-110. doi:10.1016/j.bjps.2019.07.004
99. McAllister P, Teo I, Chin K, Makubate B, Alexander Munnoch D. Bilateral Breast Reconstruction with Abdominal Free Flaps: A Single Centre, Single Surgeon Retrospective Review of 55 Consecutive Patients. *Plastic Surgery International*. 2016;2016:1-9. doi:10.1155/2016/6085624
100. Mehio G, Morsy M, Cayci C, et al. Donor-Site Morbidity and Functional Status following Medial Femoral Condyle Flap Harvest. *Plastic and reconstructive surgery*. 2018;142(5):734e-741e. doi:10.1097/PRS.0000000000004886
101. Meky M. Versatility of anterolateral thigh flap in dorsal hand reconstruction. *AAMJ*. 2015;13(Suppl 2):108-113.
102. Mekky MSA. Versatility of Anterolateral Thigh Flap in Dorsal Hand Reconstruction. *The Egyptian Journal of Plastic and Reconstructive Surgery*. 2018;42(2):311-315.

103. Misani M, Zirak C, de Mey A, Boeckx W. Release of hand burn contracture: comparing the ALT perforator flap with the gracilis free flap with split skin graft. *Burns*. 2013;39(5):965-971.
104. Mofikoya BO, Ugburo OA, Bankole OB, et al. Challenges in the organisation of a microsurgery laboratory in a low resource country. *The Nigerian postgraduate medical journal*. 2010;17(1):60-63.
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed11&NEWS=N&AN=359957197>
105. Mofikoya BO, Ajani A, Ugburo AO, Olusoga O. Surgical outcomes of diabetic hand infections in Lagos, Nigeria. *MALAWI MEDICAL JOURNAL*. 2019;31(3):198-201.
doi:10.4314/mmj.v31i3.6
106. Mohamed SA, Sakr MF, El-Hammadi HA, Moussa MM, El-Sharaky MM. The use of the "TRAM" flap in some oncological problems. *International surgery*. 2000;85(4):347-352.
107. Moldovan I, Juncar M, Dinu C, et al. Mandibular reconstruction using free vascularized iliac crest grafts and dental implants. *Clujul Medical*. 2015;88(3):391.
108. Montandon D. Surgery of noma: a 20-year experience. *Stomatologie*. 2007;104(1):1-9.
doi:10.1007/s00715-007-0024-7
109. Moro A, Pelo S, Gasparini G, et al. Virtual Surgical Planning for Reconstruction of Giant Ameloblastoma of the Mandible. *Annals of Plastic Surgery*. 2020;85(1):43-49.
110. Mousa A, Zakaria OM, Hanbal I, et al. Operative management of non-iatrogenic pediatric and adolescence peripheral arterial trauma: An experience from a resource challenged setting. *Asian journal of surgery*. 2019;42(7):761-767. doi:10.1016/j.asjsur.2018.09.012
111. Muguti GI. Early experience with reconstructive surgery at Mpilo Central Hospital, Zimbabwe. *Journal of the Royal College of Surgeons of Edinburgh*. 1990;35(4):248-251.
112. Nabawi A, Gürlek A, Patrick CW, et al. Measurement of blood flow and oxygen tension in adjacent tissues in pedicled and free flap head and neck reconstruction. *Microsurgery*. 1999;19(5):254-257. doi:10.1002/(sici)1098-2752(1999)19:5<254::aid-micr8>3.0.co;2-b
113. Nath S, Jovic G. Cancrum oris: management, incidence, and implications of human immunodeficiency virus in Zambia. *Plastic and reconstructive surgery*. 1998;102(2):350-357.
doi:10.1097/00006534-199808000-00008
114. Nkenke E, Agaimy A, Pierre MS, Gratzki N, Stockmann P, von Wilmowsky C. Intraoral microvascular anastomosis for segmental mandibular reconstruction following removal of an ameloblastoma. *Journal of Craniofacial Surgery*. 2013;24(3):e265-e270.
115. Noever G, Feurer R. The free radial forearm flap for reconstruction of facial defects in noma patients. *European Journal of Plastic Surgery*. 2000;23(1):1-6.

116. Offodile AC, Lin JA-J, Chang K-P, et al. Anterolateral Thigh Flap Combined with Reconstruction Plate Versus Double Free Flaps for Composite Mandibular Reconstruction: A Propensity Score-Matched Study. *Annals of Surgical Oncology*. 2018;25(3):829-836. doi:10.1245/s10434-017-6309-1
117. Ogunbodede EO, Arotiba JT. Camel bite injuries of the orofacial region: report of a case. *Journal of oral and maxillofacial surgery*. 1997;55(10):1174-1176.
118. Okoturo E. Non-vascularised iliac crest bone graft for immediate reconstruction of lateral mandibular defect. *Oral and maxillofacial surgery*. 2016;20(4):425-429. doi:10.1007/s10006-016-0585-y
119. Okoturo E. Regional Myocutaneous Flaps for Head and Neck Reconstruction: Experience of a Head and Neck Cancer Unit. *Nigerian journal of surgery : official publication of the Nigerian Surgical Research Society*. 2015;21(2):85-90. doi:10.4103/1117-6806.162568
120. OlaOlorun DA. Abdominal fasciocutaneous flap for upper extremity wound coverage in the developing world: indications and complications. *Tropical doctor*. 2001;31(1):45-46. doi:10.1177/004947550103100120
121. Onah II, Okwor B, Onuigbo WIB. Penetrating scalp Marjolin's ulcer involving bone and dura mater in a Nigerian hospital: Case report and literature review. *Burns*. 2010;36(4):e39-e43. doi:10.1016/j.burns.2009.04.010
122. Ooi ASH, Teven CM, Inbal A, Chang DW. The utility of the musculocutaneous anterolateral thigh flap in pharyngolaryngeal reconstruction in the high-risk patient. *Journal of Surgical Oncology*. 2017;115(7):842-847. doi:10.1002/jso.24577
123. Orakwe JC, Undie CU. Male genital injuries caused by ritual attacks in Nigeria: problems of management. *African Journal of Urology*. 2012;18(2):75-77.
124. Osiogo FO, Lai C-S, Wang W-H, Chye Y-F, Lin S-D. Retrospective review of free gracilis muscle flaps in the management of nonhealing diabetic foot ulceration. *The Journal of foot and ankle surgery : official publication of the American College of Foot and Ankle Surgeons*. 2006;45(4):252-260. doi:10.1053/j.jfas.2006.04.005
125. E. P, D. L, D.M. D, et al. A study of the patient factors affecting reconstruction after mastectomy for breast carcinoma. *The American surgeon*. 2003;69(2):95-97. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed8&NEWS=N&AN=36494631>
126. Pittet B, Mahajan AL, Alizadeh N, Schlaudraff K-U, Fasel J, Montandon D. The free serratus anterior flap and its cutaneous component for reconstruction of the face: a series of 27 cases. *Plastic and reconstructive surgery*. 2006;117(4):1277-1288.

127. Pittet B, Jaquinet A, Montandon D. Clinical Experience in the Treatment of Noma Sequelae. *Journal of Craniofacial Surgery*. 2001;12(3):273-283. doi:10.1097/00001665-200105000-00014
128. Rashid M, Tamimy MS, Rizvi STA. Benign paediatric mandibular tumours: experience in reconstruction using vascularised fibula. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2012;65(12):e325-e331.
129. Rasool MN, Naidoo KS. Supracondylar fractures: posterolateral type with brachialis muscle penetration and neurovascular injury. *Journal of Pediatric Orthopaedics*. 1999;19(4):518-522.
130. Rodgers W, Lloyd T, Fourie L, et al. Total reconstruction of the nose in settings where resources are limited. *The British journal of oral & maxillofacial surgery*. 2015;53(10):1001-1006. doi:10.1016/j.bjoms.2015.10.009
131. Rodgers W, Lloyd T, Mizen K, et al. Microvascular reconstruction of facial defects in settings where resources are limited. *British Journal of Oral and Maxillofacial Surgery*. 2016;54(1):51-56. doi:10.1016/j.bjoms.2015.10.020
132. Rohde SL, Mannion K, Zender CA, Sinard RJ. The Feasibility of Free Flap Surgery in Foreign Medical Missions. *Otolaryngology–Head and Neck Surgery*. 2013;149(2_suppl):P172-P172. doi:10.1177/0194599813496044a91
133. Rüegg EM, Gniadek P, Modarressi A, et al. Facial bone reconstruction with prefabricated vascularized calvarium flaps in children and young adults: advantages and long-term results. *JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY*. 2016;44(12):1880-1888. doi:10.1016/j.jcms.2016.08.021
134. Rüegg EM, Baratti-Mayer D, Jaquinet A, Montandon D, Pittet-Cuénod B. The surgical management of extra-articular ankylosis in noma patients. *International journal of oral and maxillofacial surgery*. 2018;47(12):1527-1533. doi:10.1016/j.ijom.2018.07.012
135. Sadek AF, Halim AS, Ismail FW, Imran YM. Reconstruction of a tibial defect with a previously fractured fibula including the fractured segment as a free osteoseptocutaneous flap. *Annals of plastic surgery*. 2014;73(4):402-404. doi:10.1097/SAP.0b013e31827fb387
136. Safoury Y. Muscle transfer for shoulder reconstruction in obstetrical brachial plexus lesions. *Handchirurgie, Mikrochirurgie, plastische Chirurgie : Organ der Deutschsprachigen Arbeitsgemeinschaft für Handchirurgie : Organ der Deutschsprachigen Arbeitsgemeinschaft für Mikrochirurgie der Peripheren Nerven und Gefässe : Organ der V.* 2005;37(5):332-336. doi:10.1055/s-2005-872818
137. Sayed SY, Ghanem HM, Mohamed WY, El-Gamal TA. " MICRO VASCULAR FREE TISSUE TRANSFER SURGERIES" IMPACT OF A DESIGNED TEACHING PROTOCOL ON NURSE'S

PERFORMANCE FOR REDUCTION OR PREVENTION OF POST OPERATIVE FLAP FAILURE. *AAMJ*. 2009;7(3).

138. Schwaiger K, Russe E, Kholosy H, et al. Reconstructive microsurgical approach for the treatment of pyoderma gangrenosum. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. 2018;71(1):44-52. doi:10.1016/j.bjps.2017.08.013
139. Shalaby HA, Saad MA. The venous island flap: is it purely venous? *British journal of plastic surgery*. 1993;46(4):285-287. doi:10.1016/0007-1226(93)90003-t
140. Shaye DA, Winters R, Rabbels J, Adentunji AS, Magee A, Vo D. Noma surgery. *The Laryngoscope*. 2019;129(1):96-99. doi:10.1002/lary.27230
141. Sica A, Kamenan K, Ouedé R, Kobenan A, Toho E. [The inner flap of the thigh: an alternative about the cover of the ankle and the foot]. *Annales de chirurgie plastique et esthetique*. 2008;53(1):9-13. doi:10.1016/j.anplas.2007.04.006
142. Singhal D, Chen Y-C, Fanzio PM, et al. Role of free flaps in the management of craniofacial neurofibromatosis: soft tissue coverage and attempted facial reanimation. *Journal of oral and maxillofacial surgery*. 2012;70(12):2916-2922.
143. Slyke AC van, Carr N, Hodges A. The Use of Free Tissue Transfer with An Anterolateral Thigh Flap for the Treatment of Large Keloids On the Head and Neck. *Plastic Surgery Case Studies*. 2016;2(2):35-36. doi:10.1177/2513826X1600200208
144. Citron I, Galiwango G, Hodges A. Challenges in global microsurgery: A six year review of outcomes at an East African hospital. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. 2016;69(2):189-195. doi:10.1016/j.bjps.2015.10.016
145. Sun AH, Xu X, Sasaki CT, Ariyan S, Steinbacher DM. A Thirty-Year Experience With Head and Neck Flap Reconstruction. *The Journal of craniofacial surgery*. 2017;28(5):1354-1361. doi:10.1097/SCS.0000000000003591
146. Sweed AH, Bolzoni AR, Kadubiec A, Beltramini GA, Cherchi A, Baj A. Factors influencing CAD/CAM accuracy in fibula free flap mandibular reconstruction. *Acta otorhinolaryngologica Italica : organo ufficiale della Societa italiana di otorinolaringologia e chirurgia cervico-facciale*. 2020;40(2):138-143. doi:10.14639/0392-100X-N0400
147. Taman E, Ragab A, Khoreba W, Attia K, Alshafey EO, Shoab SS. Single-Stage Vascular Repair and Tissue Cover in Complex Ankle Injuries. *Annals of Vascular Surgery*. 2019;61:467.e11-467.e16. doi:10.1016/j.avsg.2019.04.040
148. Tulley PN, Webb A, Chana JS, et al. Paralysis of the marginal mandibular branch of the facial nerve: treatment options. *British journal of plastic surgery*. 2000;53(5):378-385.

149. van Wingerden JJ, Oosthuizen JH. Use of the local leech *Hirudo michaelseni* in reconstructive plastic and hand surgery. *South African journal of surgery Suid-Afrikaanse tydskrif vir chirurgie*. 1997;35(1):29-31.
150. Vinzenz K, Schaudy C, Haider H, et al. Osteoplastic reconstruction techniques in noma surgery. *Stomatologie*. 2007;104(1):11-18.
151. Vinzenz K, Holle J, Würinger E. Reconstruction of the Maxilla with Prefabricated Scapular Flaps in Noma Patients. *Plastic and Reconstructive Surgery*. 2008;121(6):1964-1973. doi:10.1097/PRS.0b013e3181706dd6
152. Yi-Loong Woon C, Wei-Ee K, Tan B-K, et al. Case report journey of a noma face. *ePlasty: Open Access Journal of Plastic Surgery*. 2010;10.
153. Xingzhou Q, Wang Z, Ong HS, Chenping Z, Abdelrehem A. Accuracy of Computer-Aided Design/Computer-Aided Manufacturing Surgical Template for Guidance of Dental Implant Distraction in Mandibular Reconstruction With Free Fibula Flaps. *The Journal of craniofacial surgery*. 2020;31(2):355-359. doi:10.1097/SCS.00000000000006112
154. Yassin O. New flap for restoration of the temporal hair line. *Aesthetic plastic surgery*. 2007;31(5):596-598. doi:10.1007/s00266-007-0014-6
155. ZAKARIA Y, ABO-HASHEM A. Microsurgical Flap Reconstruction of Soft Tissue Defects of the Head and Neck Following Cancer Ablation.
156. Zender CA, Clancy K, Thuener JE, Mannion K. Surgical outreach and microvascular surgery in developing countries. *Oral Oncology*. 2018;81:69-74. doi:10.1016/J.ORALONCOLOGY.2018.04.004
157. Luo Z, Qing L, Zhou Z, Wu P, Yu F, Tang J. Reconstruction of Large Soft Tissue Defects of the Extremities in Children Using the Kiss Deep Inferior Epigastric Artery Perforator Flap to Achieve Primary Closure of Donor Site. *Annals of Plastic Surgery*. 2019;82(1):64-70.
158. Saboye J. [Plastic surgery training missions in developing countries. A 10-year experience at missions in Mali]. *Annales de chirurgie plastique et esthetique*. 1999;44(1):35-40. <http://www.elsevier.com/html/detrevue.cfm?code=CP>
159. Hweidi S. Lymphoedema in Egypt. *European Journal of Lymphology and Related Problems*. 2009;20(57):29. <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed11&NEWS=N&AN=70036375>
160. Abbas AH, Elmasry M, Steinvall I, et al. Aesthetic outcome after reconstruction of complex soft tissue defects with free antero-lateral thigh flap using simple equipment. *Journal of Surgery*. 2015;3(2-1):36-41.

161. Abbas AH, Ghobashy WA, Moghazy AM. Binocular single-refraction magnifying glasses for free flap surgery: a reliable method for developing countries. *European Journal of Plastic Surgery*. 2012;35(7):521-525.
162. Abdel Razek AAK, Denewer AT, Hegazy MAF, Hafez MTA. Role of computed tomography angiography in the diagnosis of vascular stenosis in head and neck microvascular free flap reconstruction. *International Journal of Oral and Maxillofacial Surgery*. 2014;43(7):811-815. doi:10.1016/j.ijom.2014.03.014
163. Abdelkader R, el Mahdy H, Khairalla TN, Mansour A, Zaidi NH. The antero-lateral thigh flap in coverage of extensive post traumatic upper limb defects. *Surgical Science*. 2016;7(7):309-315.
164. Abdelrahman I, Moghazy A, Abbas A, et al. A prospective randomized cost billing comparison of local fasciocutaneous perforator versus free Gracilis flap reconstruction for lower limb in a developing economy. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*. 2016;69(8):1121-1127. doi:10.1016/j.bjps.2016.04.013
165. Abir B, Abouchadi A, Tourabi K, Lakouichmi M. *Ameloblastic Carcinoma of the Mandible: A Case Report and Review of the Literature*. Médecine Buccale Chirurgie Buccale 23, 95-98 (2017). <http://10.0.4.27/mbcb/2016062>
166. Aboelatta YA, Aly HM. Free tissue transfer and replantation in pediatric patients: technical feasibility and outcome in a series of 28 patients. *Journal of hand and microsurgery*. 2013;5(2):74-80. doi:10.1007/s12593-013-0101-7
167. Addosooki A, Said E, Kenawey M, Yousef MA. Reconstruction of complex hand defects using trapezoidal osteocutaneous free fibular flap. *Microsurgery*. 2020;40(3):306-314. doi:10.1002/micr.30520
168. Addosooki AI, Alam-Eldin M, Abdel-Wanis ME-S, Yousef MAA, Dionigi P, Kenawey MO. Anterior Cervical Reconstruction Using Free Vascularized Fibular Graft after Cervical Corpectomy. *Global spine journal*. 2016;6(3):212-219. doi:10.1055/s-0035-1558653
169. Afifi AM, Mahboub TA, Ibrahim Fouad A, Azari K, Khalil HH, McCarthy JE. Active range of motion outcomes after reconstruction of burned wrist and hand deformities. *Burns : journal of the International Society for Burn Injuries*. 2016;42(4):783-789. doi:10.1016/j.burns.2016.02.004
170. Akerzoul N, Chbicheb S, Elwady W. The Role of Free Fibula Flap in the Reconstruction of a Mandibular Ameloblastoma: A Case Report. *American Journal of Oral and Maxillofacial Surgery*. 2017;4(1):5-13.
171. al Maksoud AM, Barsoum AK, Moneer M. Squamous cell carcinoma of the heel with free latissimus dorsi myocutaneous flap reconstruction: case report and technical note. *Journal of surgical case reports*. 2016;2016(5). doi:10.1093/jscr/rjw067

172. Amin AA-W, Bassiouny M, Elsebai H, et al. Fasciocutaneous free flaps for hypopharyngeal reconstruction. *Journal of reconstructive microsurgery*. 2002;18(1):1-5. doi:10.1055/s-2002-19702
173. Amin A, Bassiouny M, Sallam K, Ghally G, El-Karakasy H, El-Haddad A. Living related hemi-face skin transplant using radial forearm free flap for a xeroderma pigmentosa patient: early outcome. *Head & neck oncology*. 2010;2:18. doi:10.1186/1758-3284-2-18
174. Amr SM, El-Mofty AO, Amin SN. Anterior versus posterior approach in reconstruction of infected nonunion of the tibia using the vascularized fibular graft: potentialities and limitations. *Microsurgery*. 2002;22(3):91-107. doi:10.1002/micr.21732
175. Amr SM, El-Mofty AO, Amin SN, Morsy AM, El-Malt OM, Abdel-Aal HA. Reconstruction after resection of tumors around the knee: role of the free vascularized fibular graft. *Microsurgery*. 2000;20(5):233-251. doi:10.1002/1098-2752(2000)20:5<233::aid-micr4>3.0.co;2-o
176. Ayad WM, Mohammed AH, Ismail HM, Osama Ouf M, Elbatawy AM. Arteriovenous loop grafts for free tissue transfer in complex lower limb defects. *Plast Reconstr Surg*. 2017;41:159-164.
177. Ayad WM, Abd-Elmuktader M, ELEOWA S. Facial Reanimation with Free Musculocutaneous Latissimus Dorsi in Complex Facial Paralysis.
178. Ayad WM, Mohammed AH, Ismail HM, Ouf MO, Elbatawy AM. Free Latissimus Dorsi Muscle Flap with a Flow-Through Technique for Lower Limb Salvage. *Archives of Hand and Microsurgery*. 2019;24(2):177-182.
179. AYAD W, ZAYED EF, ABDELKAREEM M, MIKKI M, MAHMOOD NASEF MD. The Role of Free Rectus Femoris Muscle Flap in Salvage of Upper and Lower Limb Complex Defects.
180. Badran HA, Youssef MK, Shaker AA. Management of facial contour deformities with deepithelialized lateral intercostal free flap. *Annals of plastic surgery*. 1996;37(1):94-95. doi:10.1097/00000637-199607000-00015
181. Bassiouny MM, Maamoun SI, El-Shazly SE-DM, Youssef OZ. TRAM flap for immediate post mastectomy reconstruction: comparison between pedicled and free transfer. *Journal of the Egyptian National Cancer Institute*. 2005;17(4):231-238. <http://www.ncbi.nlm.nih.gov/pubmed/17102817>
182. Chait LA, Flemming J, Becker H. Hallux-to-thumb transfer by microvascular anastomosis. *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde*. 1977;52(11):429-432.
183. Daya M, Balakrishnan T. Advanced Marjolin's ulcer of the scalp in a 13-year-old boy treated by excision and free tissue transfer: Case report and review of literature. *Indian journal of*

plastic surgery : official publication of the Association of Plastic Surgeons of India.
2009;42(1):106-111. doi:10.4103/0970-0358.53020

184. Daya M, Nair V. Free radial forearm flap lip reconstruction: a clinical series and case reports of technical refinements. *Annals of plastic surgery.* 2009;62(4):361-367. doi:10.1097/SAP.0b013e31818b4515
185. Daya M, Pillay T. Head and neck microsurgical reconstruction using the superficial temporal vein for antegrade and retrograde drainage: A clinical case series. *European Journal of Plastic Surgery.* 2019;42(3):235-242. doi:10.1007/s00238-018-1479-z
186. Daya M. Peroneal artery perforator chimeric flap: changing the perspective in free fibula flap use in complex oromandibular reconstruction. *Journal of reconstructive microsurgery.* 2008;24(6):413-418. doi:10.1055/s-0028-1082891
187. Daya M, Pillay D. Voice prosthesis related expanding tracheoesophageal puncture repair: microsurgical reconstruction to pedicled pectoralis major muscle flap. *South African Journal of Surgery.* 2018;56(4):30-33.
188. Denewer A, Khater A, Farouk O, et al. Can we put a simplified algorithm for reconstruction of large scalp defects following tumor resection? *World journal of surgical oncology.* 2011;9:129. doi:10.1186/1477-7819-9-129
189. Denewer A, Khater A, Hafez MT, et al. Pharyngoesophageal reconstruction after resection of hypopharyngeal carcinoma: a new algorithm after analysis of 142 cases. *World journal of surgical oncology.* 2014;12:182. doi:10.1186/1477-7819-12-182
190. el Fahar MH. Complex Intraoral Reconstruction Using a Single Free Anterolateral Thigh Flap and Supermicrosurgery After Corrosive Ingestion in a 14-Month-Old Child. *Annals of Plastic Surgery.* 2018;80(5):500-502. doi:10.1097/SAP.0000000000001392
191. A.E. E, W.F. N, A. K, et al. Hypopharyngeal reconstruction: a comparison of three alternatives. *European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery.* 2015;272(10):3045-3050. doi:http://dx.doi.org/10.1007/s00405-014-3306-x
192. El-Gammal TA, El-Sayed A, Kotb MM, et al. Dorsal foot resurfacing using free anterolateral thigh (ALT) flap in children. *Microsurgery.* 2013;33(4):259-264. doi:10.1002/micr.22074
193. El-Gammal TA, El-Sayed A, Kotb MM, et al. Free functioning gracilis transplantation for reconstruction of elbow and hand functions in late obstetric brachial plexus palsy. *Microsurgery.* 2015;35(5):350-355. doi:10.1002/micr.22373

194. El-Gammal TA, El-Sayed A, Kotb MM, et al. Knee joint reconstruction after hemiarthritic resection using pedicled patella and vascularized fibular graft. *Microsurgery*. 2010;30(8):603-607. doi:10.1002/micr.20796
195. El-Gammal TA, Shiha AE, El-Deen MA, et al. Management of traumatic tibial defects using free vascularized fibula or Ilizarov bone transport: a comparative study. *Microsurgery*. 2008;28(5):339-346. doi:10.1002/micr.20501
196. El-Gammal TA, El-Sayed A, Kotb MM. Resection replantation of the upper limb for aggressive malignant tumors. *Archives of orthopaedic and trauma surgery*. 2002;122(3):173-176. doi:10.1007/s004020100348
197. El-Gammal TA, El-Sayed A, Kotb MM. Shoulder fusion and free-functioning gracilis transplantation in patients with elbow and shoulder paralysis caused by poliomyelitis. *Microsurgery*. 2002;22(5):199-202; discussion 203. doi:10.1002/micr.22502
198. El-Gammal TA, El-Sayed A, Kotb MM. Telescoping vascularized fibular graft: a new method for treatment of congenital tibial pseudarthrosis with severe shortening. *Journal of pediatric orthopedics Part B*. 2004;13(1):48-56. doi:10.1097/00009957-200401000-00010
199. El-Marakby H. Management of early breast cancer with breast conservative surgery. An Egyptian experience. *Journal of the Egyptian National Cancer Institute*. 2009;21(4):271-278.
200. Elsherbiny M, Mebed A, Mebed H. Microvascular radial forearm fasciocutaneous free flap for palatomaxillary reconstruction following malignant tumor resection. *Journal of the Egyptian National Cancer Institute*. 2008;20(1):90-97.
201. El-Zohairy MA. Straight midline mandibulotomy: technique and results of treatment. *Journal of the Egyptian National Cancer Institute*. 2007;19(4):292-298.
202. Fasika OM, Arotiba JT. Update on management of chronic osteomyelitis: report of four cases. *East African medical journal*. 1995;72(9):611-612.
203. Fejjal N, Hafidi J, Belmir R, et al. Two-stage free latissimus dorsi flap: a safe strategy for reconstruction of large defects of the abdominal wall. *Journal of plastic surgery and hand surgery*. 2013;47(3):232-233. doi:10.3109/2000656X.2012.748311
204. Gad SS, Ghareeb FM, Elsheikh YM, El-Nahas MA. Free anterolateral thigh flap in head and neck reconstruction. *Menoufia Medical Journal*. 2015;28(1):74.
205. Galiwango GW. Free flap surgery at Mengo Hospital, Uganda-A review of the first 19 consecutive microvascular free tissue transfers. *East and Central African Journal of Surgery*. 2009;14(1):38-43.
206. Gbotolorun O, Emeka C, Effiom O, Adewole R, Ayodele A. An audit of malignant oro-facial tumors presenting at a tertiary hospital in Lagos. *Annals of Medical and Health Sciences Research*. 2016;6(2):133. doi:10.4103/2141-9248.181840

207. Ghareeb FM. Using the extensor digitorum brevis muscle to improve donor-site morbidity of the dorsalis pedis flap. *Plastic and Reconstructive Surgery*. 2002;109(6):2031-2036. doi:10.1097/00006534-200205000-00038
208. el Ghoneimy AM, el Sherbiny M, Kamal N, et al. Use of vascularized fibular free flap in the reconstruction of the femur in pediatric and adolescent bone sarcomas: complications and functional outcome. *Journal of reconstructive microsurgery*. 2019;35(02):156-162. doi:10.1055/s-0038-1668142
209. Giessler GA, Borsche A, Lim PK, Schmidt AB, Cornelius C-P. First experiences with simultaneous skeletal and soft tissue reconstruction of noma-related facial defects. *Journal of reconstructive microsurgery*. 2012;28(2):85-94. doi:10.1055/s-0031-1284240
210. Graham RG, Swan MC, Hudson DA, van Zyl JE. The fibula free flap: advantages of the muscle sparing technique. *British journal of plastic surgery*. 2003;56(4):388-394. doi:10.1016/s0007-1226(03)00184-x
211. Hudson DA, de Jager LT. The spaghetti wrist. Simultaneous laceration of the median and ulnar nerves with flexor tendons at the wrist. *Journal of hand surgery (Edinburgh, Scotland)*. 1993;18(2):171-173. doi:10.1016/0266-7681(93)90098-z
212. Liakos D, Sofianos C, Sooka HN, Sheikh RU. Vascularised free lymph node transfer - a procedure for secondary lymphoedema management in South Africa. *SOUTH AFRICAN JOURNAL OF SURGERY*. 2019;57(1). doi:10.17159/2078-5151/2019/v57n1a2785
213. Abo Sedira M, Amin AA, Rifaat MA, El-Sebai HI, El-Badawy MAA, Aboul Kassem HA. Locally advanced tumors of the scalp: the Egyptian National Cancer Institute experience. *Journal of the Egyptian National Cancer Institute*. 2006;18(3):250-257.
214. Madaree A, McGibbon IC. Anatomic variation in the blood supply of the radial forearm flap. *Journal of reconstructive microsurgery*. 1993;9(4):277-279. doi:10.1055/s-2007-1006667
215. Madaree A, McGibbon IC, Morris WM. Reconstruction of both upper and lower lips. *Journal of cranio-maxillo-facial surgery : official publication of the European Association for Cranio-Maxillo-Facial Surgery*. 1993;21(4):168-171. doi:10.1016/s1010-5182(05)80107-6
216. Magdy EA. Surgical closure of postlaryngectomy pharyngocutaneous fistula: A defect based approach. *European Archives of Oto-Rhino-Laryngology*. 2008;265(1):97-104. doi:10.1007/s00405-007-0414-x
217. Meky M, Safoury Y. Composite anterolateral thigh perforator flaps in the management of complex hand injuries. *The Journal of hand surgery, European volume*. 2013;38(4):366-370. doi:10.1177/1753193411427648
218. Mofikoya BO, Ugburo AO, Belie OM. Clinical Assessment Score for Monitoring Free Flaps in the Dark Skin.

219. Mofikoya BO, Ugburo AO. Early experiences with microvascular free tissue transfer in lagos, Nigeria. *Nigerian journal of surgery : official publication of the Nigerian Surgical Research Society*. 2014;20(1):35-37. doi:10.4103/1117-6806.127108
220. Nabawi A, Hamza Y, Sakr M, Mousa M, Sharaki M. THE USE OF FREE FLAPS IN ADVANCED HEAD AND NECK MALIGNANCY. *Egyptian Journal of Surgery*. 2003;22(1).
221. Nangole WF, Khainga S, Aswani J, Kahoro L, Vilembwa A. Free Flaps in a Resource Constrained Environment: A Five-Year Experience—Outcomes and Lessons Learned. *Plastic Surgery International*. 2015;2015:1-6. doi:10.1155/2015/194174
222. Noaman HH, Soroor YO. Foot salvage using microsurgical free muscle flaps in severely crushed foot with soft tissue defects. *Injury*. 2019;50:S17-S20. doi:10.1016/j.injury.2019.10.040
223. Noaman HH. Management and functional outcomes of combined injuries of flexor tendons, nerves, and vessels at the wrist. *Microsurgery*. 2007;27(6):536-543. doi:10.1002/micr.20400
224. Noaman HH. Management of upper limb bone defects using free vascularized osteoseptocutaneous fibular bone graft. *Annals of plastic surgery*. 2013;71(5):503-509. doi:10.1097/SAP.0b013e3182a1aff0
225. Noaman HH. Microsurgical reconstruction of brachial artery injuries in displaced supracondylar fracture humerus in children. *Microsurgery*. 2006;26(7):498-505. doi:10.1002/micr.20277
226. Noaman HH, Shiha AE. Repeated upper limb salvage in a case of severe traumatic soft-tissue and brachial artery defect. *Microsurgery*. 2002;22(6):249-253. doi:10.1002/micr.10045
227. Okoturo E, Osasuyi A, Opaleye O, et al. Vascularized Fibula Flaps for Mandibular Reconstruction: An Institutional Audit. *Annals of Medical and Health Sciences Research*. 2017;7(1):46-51.
228. Olusoga OO, Nkemjika BN, Asoegwu CN, Kanu OO, Ugburo AO, Mofikoya BO. Reconstruction of complex craniofacial defects by free flaps: Two case reports. *The Nigerian postgraduate medical journal*. 2016;23(2):97-100. doi:10.4103/1117-1936.186298
229. Oluwatosin OM, Adigun IA, Shokunbi MT, Malomo AO, Komolafe EO, Olawoye OA. Problems of micro vascular free tissue transfer. *Niger J Surg*. 2000;7(01):29-31.
230. Passos G, Rogers AD, Price CE, et al. Loupe magnification for head and neck free flap reconstruction in a developing country. *European Journal of Plastic Surgery*. 2015;38(5):363-370. http://10.0.3.239/s00238-015-1108-z

231. Pearce EC, Mainthia R, Freeman KL, Mueller JL, Rohde SL, Netterville JL. The usefulness of a yearly head and neck surgery trip to rural Kenya. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*. 2013;149(5):727-732. doi:10.1177/0194599813504901
232. Rifaat MA. Lower lip reconstruction after tumor resection; a single author's experience with various methods. *Journal of the Egyptian National Cancer Institute*. 2006;18(4):323-333.
233. Safoury Y. Free vascularized fibula for the treatment of traumatic bone defects and nonunion of the forearm bones. *Journal of hand surgery (Edinburgh, Scotland)*. 2005;30(1):67-72. doi:10.1016/j.jhsb.2004.09.007
234. Salem HK, Mostafa T. Primary anastomosis of the traumatically amputated penis. *Andrologia*. 2009;41(4):264-267. doi:10.1111/j.1439-0272.2009.00925.x
235. Semaya AE-S, Badawy E, Hasan M, El-Nakeeb RM. Management of post-traumatic bone defects of the tibia using vascularised fibular graft combined with Ilizarov external fixator. *Injury*. 2016;47(4):969-975. doi:10.1016/j.injury.2016.01.033
236. SHAKER AA. Potential Sources for Vein Transposition in Microsurgery.
237. SHAKER AA, EL-GAZZAR KM, ATTEIA KS. Versatility of the Radial Forearm Free Flap in Facial Reconstruction. *Egypt, J Plast Reconstr Surg*. 2016;40(2):289-296.
238. SIEF K, SHAKER AA. Salvage of Severely Mutilated Lower Limb Using Cross-Leg Free Latissimus Dorsi Flap. *Egypt, J Plast Reconstr Surg*. 2010;34(1):17-22.
239. Tazi MF, Ahallal Y, Khallouk A, Elfassi MJ, Farih MH. Spectacularly successful microsurgical penile replantation in an assaulted patient: one case report. *Case reports in urology*. 2011;2011:865489. doi:10.1155/2011/865489
240. Tocco-Tussardi I, Presman B, Cherubino M, Garusi C, Bassetto F. Microsurgery "without borders": new limits for reconstruction of post-burn sequelae in the humanitarian setting. *Annals of burns and fire disasters*. 2016;29(1):66-70.
241. van der Merwe A, Graewe F, Zuhlke A, et al. Penile allotransplantation for penis amputation following ritual circumcision: a case report with 24 months of follow-up. *LANCET*. 2017;390(10099):1038-1047. doi:10.1016/S0140-6736(17)31807-X
242. van Lierop AC, Fagan JJ, Taylor KL. Recurrent chordoma of the palate occurring in the surgical pathway: a case report. *Auris, nasus, larynx*. 2008;35(3):447-450. doi:10.1016/j.anl.2007.09.006
243. Visse JH, Adendorff DJ, Malherbe WD. Free flap transfer with microvascular anastomosis. *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde*. 1976;50(51):2026-2031.

244. Wamalwa AO, Nangole FW, Khainga SO. Lymph node transplant in Kenya: a case series of 20 patients. *SOUTH AFRICAN JOURNAL OF SURGERY*. 2019;57(1):54+. doi:10.17159/2078-5151/2018/v57n1a2735