

The 100 Most-disruptive Articles in Plastic and Reconstructive Surgery and Sub-specialties (1954–2014)

Marek A. Hansdorfer, MD*
 Sydney R. Horen, BA*
 Brandon E. Alba, MD*
 Jennifer N. Akin, BA*
 Amir H. Dorafshar, MD*
 Adan Z. Becerra, PhD†

Background: Alternative bibliometrics have recently been the subject of significantly increased interest. The disruption index is a new bibliometric that was recently applied to surgery and urology and identifies papers that shift paradigms and eclipse previous research in a given field.

Methods: The 100 most-disruptive publications in the 14 most prominent plastic and reconstructive surgery and subspecialty journals were identified.

Results: We present the 100 most-disruptive studies as well as the 100 most-cited studies for comparison in n=14 of the most popular plastic and reconstructive surgery (and subspecialty) journals between 1954 and 2014. The 100 most-disruptive publications in these journals were more disruptive than 99.8% of all PubMed papers. Plastic and Reconstructive Surgery (PRS) had the most papers in the top 100 (n=64) followed by British Journal of Plastic Surgery (currently Journal of Plastic, Reconstructive & Aesthetic Surgery, n=15), and Journal of Oral and Maxillofacial Surgery (n=7). PRS had 9 of the top 10 papers. However, Clinics in Plastic Surgery had the highest average disruption score for all its published papers (0.0029). The correlation coefficient linking disruption scores and citation counts was 0.01 and 0.11, respectively. The most common decade represented in the top 100 was the 1980's (n=31) and the least common was the 2000's (n=9).

Conclusions: This is the first application of the disruption index to plastic and reconstructive surgery. The disruption score provides a unique ability to identify research that has shifted paradigms and driven the innovation that defines our specialty. (*Plast Reconstr Surg Glob Open* 2021;9:e3446; doi: [10.1097/GOX.0000000000003446](https://doi.org/10.1097/GOX.0000000000003446); Published online 26 March 2021.)

INTRODUCTION

The field of plastic and reconstructive surgery has significantly evolved over the past several decades. The innovation that is part and parcel to the DNA of our specialty has driven constant progress in both clinical and basic science research. Research publications are an important aspect of academic productivity and can also influence professional accomplishments such as promotion, tenure, and respect of peers.¹ Many different metrics have been

utilized to quantify the impact of publications. Both historically and currently, the most commonly-utilized metric remains citation count.^{2,3} However, citation count has notable limitations and problems that prevent it from optimally identifying impactful work; for example, not all citations are positive and equal and it is a purely quantitative metric. In addition, older publications will inherently accumulate more citations over time than newer publications, skewing the true significance of citation count.

In response to the shortcomings of traditional measures of research impact, bibliometricians have developed new metrics to better capture the influence and impact of publications.⁴ One such metric is the “disruption index,” which seeks to measure the degree to which an article *disrupts* its field and induces a paradigm shift by “introducing something new that eclipses attention to previous work upon which it has built.”^{5,6} In other words, a *disruptive* article displaces the literature that it cited. Disruption scores range from -1 to +1, with positive scores (>0) corresponding to *disruptive* articles and negative (<0) corresponding to *developmental* articles (1.0 is a maximally disruptive

From the *Division of Plastic & Reconstructive Surgery, Rush University Medical Center, Chicago, Ill.; and †Department of Surgery, Rush University Medical Center, Chicago, Ill.

Drs. Dorafshar and Becerra contributed equally to this work.

Received for publication January 5, 2021; accepted January 5, 2021.

Copyright © 2021 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: [10.1097/GOX.0000000000003446](https://doi.org/10.1097/GOX.0000000000003446)

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

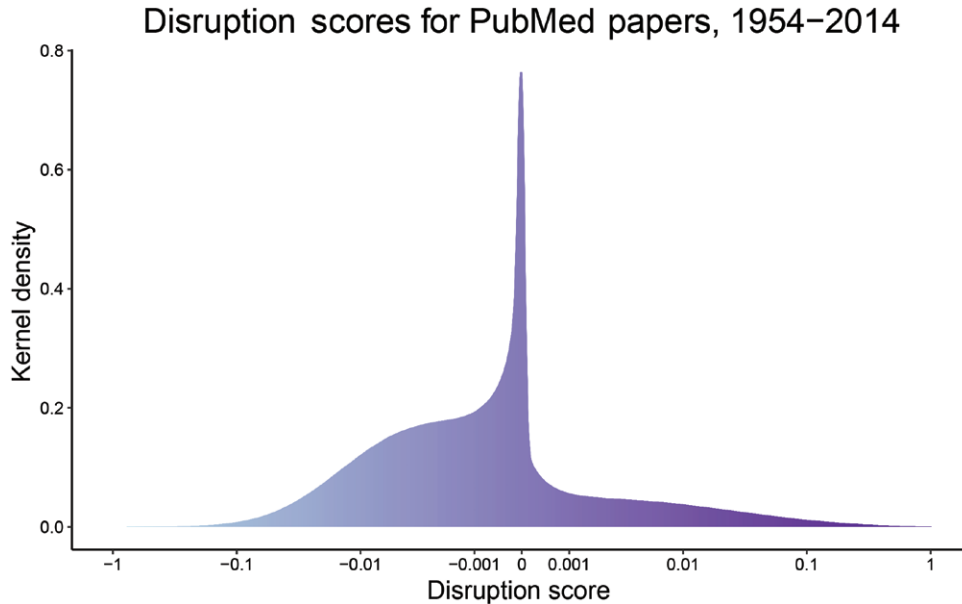


Fig. 1. Kernel density distribution plot of all PubMed-indexed plastic surgery articles (1954–2014). Negative values indicate developmental articles, and positive values indicate disruptive articles.

article). Disruptive articles tend to change established principles, whereas developmental studies tend to build upon those existing principles.^{5,6}

As the volume of research within the field of plastic surgery continues to explode, quantifying the impact of various publications is critical to identify shifting paradigms and prioritize research and funding. Previous studies have identified impactful publications in plastic surgery using metrics such as citation count^{7,8} or the Altmetric score recently seen in *Plastic and Reconstructive Surgery*.^{9,10} Although recently applied to both surgery¹¹ and urology,¹² no studies have applied the disruption score (DS) metric to the plastic and reconstructive (and subspecialty) literature. The purpose of this study was to identify the most-disruptive publications, compare the disruption metric to citation count, and to quantify the most-disruptive journals in plastic and reconstructive surgery.

METHODS

A search of PubMed-indexed literature was performed in March 2020 to identify PubMed Identifiers (PMIDs) of all articles published in *Plastic and Reconstructive Surgery* (PRs), *Annals of Plastic Surgery*, *British Journal of Plastic Surgery* (currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*), *Journal of Oral and Maxillofacial Surgery*, *Journal of Craniomaxillofacial Surgery*, *Journal of Craniofacial Surgery*, *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery*, *Clinics in Plastic Surgery*, *Journal of Hand Surgery (American)*, *Journal of Hand Surgery (European/British)*, *Journal of Reconstructive Microsurgery*, *JAMA Facial Plastic Surgery*, *Aesthetic Surgery Journal*, and *Aesthetic Plastic Surgery*. The PMIDs were then merged with a validated database of DSs (<https://lingfeiwu.github.io/smallTeams/>) for all articles indexed in PubMed published between 1954 and 2014.⁵

The DS for a focal article is the ratio of 2 numbers⁵ and is represented by the equation

$DS = (A-B)/(C+D)$. The numerator is the number of future publications that cited the focal article without also citing any of its references (A) minus the number of future publications that cited the focal article and at least one of its references (B). The denominator is the total number of times the focal article was cited (C) plus the number of future publications that cited at least one of the references of the focal article, but not the focal article itself (D).⁵ To illustrate the calculation of a figurative study's DS, we present here a sample calculation. Assuming this study was later cited a total of 50 times, and that 40 of these citations did not also cite one of the citations of the index article but 10 studies did, the numerator would be $40-10 = 30$. Assuming then that 30 future studies cited at least one of the references of the focal study but not the focal study itself, the denominator would be $50+30 = 80$, resulting in a DS of $30/80 = 0.375$.

After calculating the DS and identifying the most-disruptive articles, we then utilized the publicly available iCite tool (<https://icite.od.nih.gov/>)¹³ developed by National Institute of Health to obtain the number of times each article was cited. We ranked the articles in order of DS and selected out the top 100 for inclusion in this study. We also ranked all articles published by the included journals in the time period studied by the number of citations and selected out the top 100. A kernel density plot of all literature indexed in PubMed (1954–2014) was generated to characterize the distribution of DSs in the entire PubMed universe. We limited the study period up to the year 2014 for 2 reasons: first, a period of several years after publication date is needed to allow for future studies to cite a focal article and to calculate a DS, and second, the time period 1954–2014 were the years that were available in the publicly-available database utilized.⁵ Statistical analysis was performed utilizing R Statistical Software (version 4.0.0, Auckland, New Zealand). Figures and plots were created using the *ggplot2* package available in R.¹⁴

Table 1. Details of the 100 Most-disruptive Articles in Plastic and Reconstructive Surgery and Sub-specialties (1954–2014)

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
1	Minimally invasive, limited incision breast surgery: passing fat or emerging trend?	Rod J. Rohrich		2002	University of Texas Southwestern Medical Center, Dallas, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.909090909	7	Viewpoint
2	The ultimate fate of freeze dried fascia: experience with its use in the correction of facial paralysis.	R. K. Snyderman	T. E. Starzynski	1966	Memorial Hospital for Cancer and Allied Diseases, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.888888889	8	Case study
3	A suction curette for removal of excessive local deposits of subcutaneous fat.	U. K. Kesselring	R. Meyer	1978	Lausanne, Switzerland	<i>Plastic and Reconstructive Surgery</i>	0.857142857	43	Methodologies
4	A new and reliable method of securing skin grafts to the difficult recipient bed.	A. M. Schneider	L. C. Argenta	1998	Wake Forest University School of Medicine, Winston-Salem, N.C.	<i>Plastic and Reconstructive Surgery</i>	0.857142857	98	Ideas and innovations/ methodologies
5	Body contouring by lipolysis: a 5-year experience with over 3000 cases.	Y. G. Illouz		1983	Paris, France	<i>Plastic and Reconstructive Surgery</i>	0.823741007	263	Review
6	The zig-zag volar-digital incision for flexor-tendon surgery.	J. M. Bruner		1967	Des Moines, Iowa	<i>Plastic and Reconstructive Surgery</i>	0.813559322	61	Methodologies
7	Palatal fistulae following cleft palate surgery.	F. E. Abyholm	G. Eskeland	1979	Oslo, Norway	<i>Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery</i>	0.813333333	52	Review
8	Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty.	J. H. Sheen		1984	UCLA, Los Angeles, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.760869565	267	Case study
9	Reduction mammoplasty with a vertical dermal flap.	P. K. McKissock		1972	Torrance, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.743842365	138	Methodologies/ review
10	Internal fixation of certain fractures of the mandible by bone plating.	J. A. Snell	W. A. Dott	1969	Melbourne, Australia	<i>Plastic and Reconstructive Surgery</i>	0.714285714	23	Review
11	“Outbreak” of hand injuries during Hajj festivities in Saudi Arabia.	M. M. Rahman	M. M. Al-Qattan	1999	King Saud University and King Fahad National Guard Hospital, Riyadh, Saudi Arabia	<i>Reconstructive Surgery Annals of Plastic Surgery</i>	0.714285714	12	Review
12	The use of lingual flaps in repair of fistulas of the hard palate.	J. Guerret-Santos	J. T. Altamirano	1966	Guadalajara, Mexico	<i>Plastic and Reconstructive Surgery</i>	0.69924812	75	Case study
13	A new technique for reduction mammoplasty.	L. Ribeiro		1975	Rio de Janeiro, Brazil	<i>Plastic and Reconstructive Surgery</i>	0.692913386	104	Methodologies
14	Abnormal anatomy of the muscles of palatopharyngeal closure in cleft palates: anatomical and surgical considerations based on the autopsies of 18 unoperated cleft palates	M. Fára	J. Dvorák	1970	Prague, Czech	<i>Plastic and Reconstructive Surgery</i>	0.68627451	14	Case study
15	Microsurgical reconstruction of the lingual nerve.	P. G. Mozsary	R. A. Middleton	1984	Department of Oral Surgery, University of the Pacific School of Dentistry, San Francisco, Calif.	<i>Journal of Oral Maxillofacial Surgery</i>	0.68	51	Case study
16	Analysis of 200 free flaps.	T. Harashima		1988	Keio University Hospital, Tokyo	<i>British Journal of Plastic Surgery</i>	0.672043011	100	Review

AQ6

(Continued)

Table 1. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
17	The salutary effects of the bed on the survival of experimental flaps.	T. Kaufman	J. W. Futrell	1985	?	<i>Annals of Plastic Surgery</i>	0.6666666667	28	?
18	Anesthesia for tongue flaps in infants.	L. Naik	P. Sawant	1993	Bombay, India	<i>Plastic and Reconstructive Surgery</i>	0.6666666667	2	Comment/ methodologies
19	Intraoperative K-wire protection.	R. Thangaraj	S. Singh	2010	Birmingham, UK	<i>British Journal of Plastic Surgery</i>	0.6666666667	3	Methodologies
20	Minimizing the pain of local anesthesia.	K. A. Arndt	J. M. Noe	2013	Beth Israel Hospital/ Harvard Medical School, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.661764706	65	Methodologies/ prospective cohort
21	Meralgia paresthetica: a complication of iliac bone procurement.	A. M. Weikel	M. B. Habal	1977	University of Florida/ Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.66	57	Case report
22	A simple technique for locating the umbilicus in abdominoplasty.	S. Hoffman		1989	Mount Sinai School of Medicine, City University of New York	<i>Plastic and Reconstructive Surgery</i>	0.642857143	8	Ideas and innovations/ methodologies
23	The endoscopic breast augmentation: the transumbilical insertion of saline-filled breast implants.	G. W. Johnson	J. E. Christ	1993	Houston, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.641975309	41	Methodologies/ case series
24	Use of off-label and non-approved drugs and devices in plastic surgery.	Rod J. Rohrich	Neal R. Reisman	2003	University of Texas Southwestern Medical School, Dallas, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.631578947	14	Viewpoint
25	Vaginal reconstruction with gracilis myocutaneous flaps.	J. B. McCraw	C. E. Horton	1976	Lackland Airforce Base, Tex./ Eastern Virginia Medical School, Norfolk, Va.	<i>Plastic and Reconstructive Surgery</i>	0.627071823	234	Case report
26	Anatomy and arteriography of cleft lips in stillborn children.	M. Fára		1968	Prague, Czech	<i>Plastic and Reconstructive Surgery</i>	0.615384615	30	Cadaveric study
27	Public attitudes toward oral surgery: results of a Gallup poll.	J. Delfino		1997	St. John's Mercy Hospital, St. Louis, Mo.	<i>Journal of Oral Maxillofacial Surgery</i>	0.615384615	13	Survey
28	Cell size and growth characteristics of cultured fibroblasts isolated from normal and keloid tissue.	J. D. Russell	W. S. Witt	1976	Mchary Medical College, Nashville, Tenn.	<i>Plastic and Reconstructive Surgery</i>	0.613333333	40	Basic science
29	Unilateral galactoceles following augmentation mammoplasty.	E. D. DeLoach	L. E. Ruf	1994	Memorial Medical Center, Savannah, Ga.	<i>Annals of Plastic Surgery</i>	0.611111111	15	Case report
30	A retrospective study of 1,521 mandibular fractures.	P. N. Bochlogyros		1985	University of Minster, Waldyerstrasse, Minster, West Germany	<i>Journal of Oral Maxillofacial Surgery</i>	0.61	72	Review
31	Johann Friedrich Dieffenbach (1794-1847).	R. M. Goldwyn		1968	Harvard Medical School, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.6	7	Historical review
32	The role of cosmetic surgery in criminal rehabilitation.	A. G. Schuring	R. E. Dodge Jr	1967	New Orleans, La.	<i>Plastic and Reconstructive Surgery</i>	0.6	2	Case-control study
33	A plea for reducing the number of positions for residency training in plastic surgery.	R. A. Young		1994	Chesterfield, Missouri	<i>Plastic and Reconstructive Surgery</i>	0.6	2	Comment
34	Frank Hastings Hamilton: a pioneer American plastic surgeon.	Germania S. Baux	Joseph G. McCarthy	2004	University of California, San Francisco, Calif./ New York University Medical Center	<i>Plastic and Reconstructive Surgery</i>	0.6	4	Historical review
35	A radial forearm flap based on an extended dissection of the cephalic vein. The longest venous pedicle? Case report.	Y. Nakayama	T. Ino	1986	University of Tsukuba, Sakura-mura, Niihari-gun, Ibaraki, Japan	<i>British Journal of Plastic Surgery</i>	0.592592593	16	Case report
36	Congenital claw-like fingers and toes. Case report of two siblings.	T. Egawa		1977	?	<i>Plastic and Reconstructive Surgery</i>	0.590909091	30	Case report (Continued)

Table 1. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
37	Geometric considerations in the design of rotation flaps in the scalp and forehead region.	R. B. Ahuja		1988	New Delhi, India	<i>Plastic and Reconstructive Surgery</i>	0.580645161	22	Methodologies
38	Hooked forceps.	I. J. Peled		1984	?	<i>Annals of Plastic Surgery</i>	0.571428571	3	Methodologies
39	Some characteristics of endoscopic and radiological systems used in elaboration of the diagnosis of velopharyngeal incompetence.	R. W. Pigott	A. P. Makepeace	1982	Frenchay Hospital, Bristol and The University of Bristol, England	<i>British Journal of Plastic Surgery</i>	0.571428571	23	Methodologies/comparative study
40	The wrestler's ear.	J. C. Kelleher	R. K. Dean	1967	Toledo, Ohio	<i>Plastic and Reconstructive Surgery</i>	0.565217391	34	Case study
41	"Gate flap" for the total reconstruction of the lower lip.	R. Fujimori		1980	?	<i>British Journal of Plastic Surgery</i>	0.554347826	50	Longitudinal study
42	Longitudinal study of growth in bilateral cleft lip and palate, from infancy to adolescence.	H. Friede	S. Pruzansky	1972	University of Chicago, Ill.	<i>Plastic and Reconstructive Surgery</i>	0.546511628	36	Review
43	Review of long-term results in supportive treatment of facial paralysis.	B. S. Freeman		1979	Houston, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.541666667	17	Review/comparative study
44	Replantation of the lower extremity.	Z. W. Chen	B. F. Zeng	1983	Shanghai, People's Republic of China	<i>Clinics in Plastic Surgery</i>	0.538461538	22	?
45	The stretched scar: a clinical and histological study.	B. C. Sommerlad	J. M. Creasey	1978	Canniesburn Hospital, Bearsden, Glasgow England / Porton Down, Wiltshire, England	<i>British Journal of Plastic Surgery</i>	0.537037037	28	Clinical trial
46	Comparative reliability of nasal pharyngoscopy and videofluorography in the assessment of velopharyngeal incompetence.	S. W. Sinclair	A. Bracka	1982	Frenchay Hospital, Bristol, England	<i>British Journal of Plastic Surgery</i>	0.53125	17	Review/comparative study
47	A study of the supraorbital nerve.	D. M. Knize		1995	University of Colorado, Denver, Colo.	<i>Plastic and Reconstructive Surgery</i>	0.524752475	79	Cadaveric study/case study
48	An island flap from the first web space of the foot to cover plantar ulcers.	H. J. Buncke Jr	L. B. Colen	1980	San Francisco, Calif.	<i>British Journal of Plastic Surgery</i>	0.52173913	15	Case report
49	The four-flap Z-plasty.	R. M. Woolf	T. R. Broadbent	1972	Salt Lake City, Utah	<i>Plastic and Reconstructive Surgery</i>	0.507462687	43	Methodologies
50	Facial injuries from automobile accidents: a study of 400 consecutive cases.	R. C. Schultz		1967	Des Plaines, Ill.	<i>Plastic and Reconstructive Surgery</i>	0.504761905	34	Review
51	A swallowing characteristic noted in a glossectomy patient. Case report.	R. Massengill Jr	K. Pickrell	1970	Duke University, Durham, N.C.	<i>Plastic and Reconstructive Surgery</i>	0.5	12	Case report
52	Chondritis in the burned ear.	J. A. Dowling	J. A. Moncrief	1968	Brooke Army Medical Center, Fort Sam Houston, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.5	24	Review/retrospective study
53	The sonic digitizer: a rapid and accurate method to assess the size of experimental flaps.	T. Kaufman	M. I. Siegel	1984	?	<i>Annals of Plastic Surgery</i>	0.5	3	Comparative study
54	A simple means of maintaining light handle sterility.	R. S. Singer	A. L. Sisk	1984	Medical College of Georgia, Augusta, Ga.	<i>Journal of Oral Maxillofacial Surgery</i>	0.5	1	Methodologies
55	A study of the outcome of the American Society for Aesthetic Plastic Surgery research grant program.	B. L. Cunningham	G. H. Landis	1993	University of Minnesota Medical School, Minn.	<i>Plastic and Reconstructive Surgery</i>	0.5	3	Survey

(Continued)

Table 1. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
56	What age(s) for face lifts?	V. S. Lambros		1998	Newport Beach, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.5	3	Comment
57	Who decides the breast augmentation parameters?	Richard V. Dowden		2003	Cleveland, Ohio	<i>Plastic and Reconstructive Surgery</i>	0.5	6	Editorial
58	“Sandwich” dressing for pediatric hand surgery.	Nikesh K. Patel	James G. Hoehn	2009	Albany Medical Center; Albany, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.5	1	Viewpoint/ methodologies
59	Cleft lip-cleft palate closure: the unknown contributions of Harvey Cushing.	Amir H. Dorafshar	Richard J. Redett	2010	The Johns Hopkins Medical Institute, Baltimore, Md.	<i>Plastic and Reconstructive Surgery</i>	0.5	2	Case study
60	Maxillary arch alignment in the bilateral cleft lip and palate infant, using pinned coaxial screw appliance.	N. G. Georgiade	R. A. Latham	1975	Duke University, Durham, N.C.	<i>Plastic and Reconstructive Surgery</i>	0.492063492	62	Methodologies/ case study
61	How soon may the axial vessels of a surviving free flap be safely ligated: a study in pigs.	M. J. Black	L. A. Sharzer	1978	Melbourne, Australia	<i>British Journal of Plastic Surgery</i>	0.488372093	60	Animal study
62	A rectus abdominis myocutaneous flap to reconstruct abdominal wall defects.	S. J. Mathes	J. Bostwick III	1977	Emory University School of Medicine, Atlanta, Ga.	<i>British Journal of Plastic Surgery</i>	0.484375	90	Case report
63	A simplified stent dressing technique using elastic rubber bands.	F. Prunés	H. Asbun	1989	Kern Medical Center, Bakersfield, Calif.	<i>Annals of Plastic Surgery</i>	0.482758621	10	Methodologies
64	Nasendoscopy: significant refinements of a direct-viewing technique of the velopharyngeal sphincter.	D. J. David	A. Bagnall	1982	North Adelaide, Australia	<i>Plastic and Reconstructive Surgery</i>	0.481481481	7	Methodologies
65	A comparison of absorbable and nonabsorbable suture materials for skin repair.	B. Guyuron	C. Vaughan	1992	Mt. Sinai Medical Center, Cleveland, Ohio	<i>Plastic and Reconstructive Surgery</i>	0.480769231	35	Comparative study
66	Hidradenitis suppurativa—A clinical review.	J. D. Watson		1985	Cannies-burn Hospital, Bearsden, Glasgow, UK/ Frenchay Hospital, Bristol, UK	<i>British Journal of Plastic Surgery</i>	0.479166667	60	Retrospective review
67	Mandibular lengthening by gradual distraction. Preliminary report.	C. C. Snyder	E. Z. Browne Jr	1973	Veterans Administration Hospital, Salt Lake City, Utah	<i>Plastic and Reconstructive Surgery</i>	0.474725275	290	Methodologies/ animal study
68	Foreign body in the sphenoid sinus.	C. Dimitriou	C. Antoniadis	1992	Thessaloniki, Greece	<i>Journal of Craniomaxillofacial Surgery</i>	0.473684211	13	Case report
69	The surgical face lift—rhytidectomy.	H. Conway		1970	Cornell University, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.465753425	19	Review
70	Critical reappraisal of Medical Research Council muscle testing for elbow flexion.	Michael C. MacAvoy	David P. Green	2007	Permanente Medical Group of South San Francisco, San Francisco, Calif.	<i>Journal of Hand Surgery (American)</i>	0.461538462	25	Cadaveric study
71	Indentation tonometry of breasts.	H. Hayes Jr	P. McLeod	1979	University of Arkansas, Little Rock, Ark.	<i>Plastic and Reconstructive Surgery</i>	0.454545455	5	Comparative study
72	Definition and classification of plastic surgery.	R. K. Sandhir		1997	Delhi, India	<i>Plastic and Reconstructive Surgery</i>	0.454545455	6	Editorial
73	Nipple or areolar reduction with simultaneous breast augmentation.	Richard A. Baxter		2003	Mountlake Terrace, Wash.	<i>Plastic and Reconstructive Surgery</i>	0.454545455	7	Case series/ methodologies
74	The pocket principle: a new technique for the reattachment of a severed ear part.	R. A. Mladick	B. I. Cohen	1971	Norfolk General Hospital, Norfolk, Va.	<i>Plastic and Reconstructive Surgery</i>	0.449541284	54	Case report
75	Hildreth’s test is a reliable clinical sign for the diagnosis of glomus tumours.	H. Giele		2002	The Radcliffe Infirmary, Oxford, UK	<i>Journal of Hand Surgery (European/British)</i>	0.448275862	24	Prospective analysis

(Continued)

Table 1. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
76	A practical guide to surgical loupes.	J. M. Baker	R. A. Meals	1997	University of California, Los Angeles School of Medicine, Los Angeles, Calif.	<i>Journal of Hand Surgery (American)</i>	0.444444444	12	Methodologies
77	Arthroscopy of the human temporomandibular joint.	J. P. McCain		1988	University of Miami, Miami, Fla.	<i>Journal of Oral Maxillofacial Surgery</i>	0.443396226	69	Cadaveric study/case study
78	Reduction mammoplasty by the "B" technique.	P. Regnault		1974	Montreal, Canada	<i>Plastic and Reconstructive Surgery</i>	0.442307692	48	Methodologies/case series
79	The effect of form and dimension on the management of the maxillary arch in unilateral cleft lip and palate conditions.	A. G. Huddart		1987	Wordsley Hospital, Stourbridge, West Midlands, England	<i>Scandinavian Journal of Plastic and Reconstructive Surgery</i>	0.4375	9	Review
80	Precision rhinoplasty. Part I: The role of life-size photographs and soft-tissue cephalometric analysis.	B. Guyuron		1988	Mount Sinai Hospital, Cleveland, Ohio	<i>Plastic and Reconstructive Surgery</i>	0.435185185	55	Methodologies
81	The distribution of lymph nodes in and around the parotid gland: an anatomical study.	M. E. McKean	I. A. McGregor	1985	Royal Infirmary, Glasgow and the Plastic Surgery Unit, Canniesburn Hospital, Glasgow	<i>British Journal of Plastic Surgery</i>	0.433333333	56	Cadaveric study
82	Silastic reconstruction of temporomandibular joint meniscus.	W. C. Hansen	B. W. Deshazo	1969	Los Angeles, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.428571429	38	Case study
83	The transvestibular approach to the nasal tip and dorsum: a new refinement in rhinoplasty.	N. S. Fuleihan		1998	Boston University Medical Center, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.428571429	3	Methodologies
84	Facial width problems associated with rigid fixation of mandibular fractures: case reports.	E. Ellis III	W. Tharanon	1992	University of Texas, Southwestern Medical Center, Dallas, Tex.	<i>Journal of Oral Maxillofacial Surgery</i>	0.424242424	20	Case report/methodologies
85	Another method to lengthen the columella in the double cleft patient.	R. O. Brauer	D. W. Foerster	1966	Houston, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.424242424	11	Methodologies/case study
86	Reanimation of lower lip reconstructed by flaps.	C. P. Sawhney		1986	Chandigarh, India	<i>British Journal of Plastic Surgery</i>	0.423076923	18	Methodologies/case study
87	The influence of plastic surgery "reality TV" on cosmetic surgery patient expectations and decision making.	Richard J. Crockett	John A. Persing	2007	Yale University School of Medicine, New Haven, Conn.	<i>Plastic and Reconstructive Surgery</i>	0.422222222	35	Survey
88	Reversible, titrated deep sedation for major office surgery.	A. J. McDowell	D. R. Whitlow	1977	Burbank, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.416666667	6	Consecutive case series
89	When to replant a fingertip after its complete amputation.	N. I. Elsbay		1977	Medical College of Georgia, Augusta, Ga.	<i>Plastic and Reconstructive Surgery</i>	0.416666667	31	Comparative study
90	Use of temporal muscle flap for reconstruction after orbito-maxillary resections for cancer.	V. Y. Bakamjian	S. G. Souther	1975	Stanford University, California/Roosevelt Park Memorial Hospital, Buffalo, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.415384615	61	Case Study/methodologies
91	Inferior epigastric artery skin flaps without rectus abdominis muscle.	I. Koshima	S. Soeda	1989	University of Tsukuba, Ibaraki, Japan	<i>British Journal of Plastic Surgery</i>	0.412451362	502	Case report
92	Bilateral cleft lip and a primary forked flap: a preliminary report.	D. R. Millard		1967	Miami, Fla.	<i>Plastic and Reconstructive Surgery</i>	0.409836066	33	Methodologies/case study

(Continued)

Table 1. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	Disruption Score	Citation Count	Study Design
93	Naso-orbital fractures and traumatic deformities of the medial canthus.	J. M. Converse	B. Smith	1966	New York University, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.409090909	27	Methodologies/ case study
94	Successful treatment of some fibrous envelope contractures around breast implants.	B. S. Freeman		1972	Houston, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.407894737	14	Methodologies/ case series
95	Surgical skin-marking techniques.	M. S. Granick	E. W. Jones	1987	Pittsburg, Pa.	<i>Plastic and Reconstructive Surgery</i>	0.405797101	25	Animal Study/ methodologies
96	Coverage of exposed bone by muscle transposition and skin grafting.	L. O. Vasconez	J. McCraw	1974	Emory University, Atlanta, Ga.	<i>Plastic and Reconstructive Surgery</i>	0.404494382	44	Review
97	Incidence of the Robin Anomalad (Pierre Robin syndrome).	P. G. Bush	A. J. Williams	1985	Royal Liverpool Children's Hospital, Liverpool, UK	<i>British Journal of Plastic Surgery</i>	0.404040404	93	Review/analysis
98	Fractures of the mandible: a review of 580 cases.	R. A. Olson	D. B. Osbon	1982	University of Iowa, Iowa	<i>Journal of Oral Maxillofacial Surgery</i>	0.402366864	142	Review
99	The honor and responsibility of teaching in plastic surgery.	J. W. May Jr.		1991	Massachusetts General Hospital, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.4	6	Editorial
100	A case of an intratendinous ganglion.	S. C. Young	A. Freiberg	1985	University of Toronto, Toronto, Ontario, Canada	<i>Journal of Hand Surgery (American)</i>	0.4	14	Case report

Table 2. Details of the 100 Most-cited Articles in Plastic and Reconstructive Surgery and Sub-specialties (1954–2014)

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
1	Hemangiomas and vascular malformations in infants and children: a classification based on endothelial characteristics.	J. B. Mulliken	J. Glowacki	1982	Harvard Medical School, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.166480239	1447
2	Pamidronate (Aredia) and zoledronate (Zometa) induced avascular necrosis of the jaws: a growing epidemic.	Robert E. Marx		2003	Miami, Fla.	<i>Journal of Oral Maxillofacial Surgery</i>	0.301264679	1228
3	Vacuum-assisted closure: a new method for wound control and treatment: clinical experience.	L. C. Argenta	M. J. Morykwas	1997	Bowman Gray School of Medicine, Winston-Salem, N.C.	<i>Annals of Plastic Surgery</i>	-0.08281315	1037
4	Osteonecrosis of the jaws associated with the use of bisphosphonates: a review of 63 cases.	Salvatore L. Ruggiero	Stephen L. Engroff	2004	Division of Oral and Maxillofacial Surgery, Long Island Jewish Medical Center, New Hyde Park, N.Y.	<i>Journal of Oral Maxillofacial Surgery</i>	0.014390132	1024
5	Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation.	M. J. Morykwas	W. McGuirt	1997	Bowman Gray School of Medicine, Winston-Salem, N.C.	<i>Annals of Plastic Surgery</i>	0.097110215	1005
6	Lengthening the human mandible by gradual distraction.	J. G. McCarthy	B. H. Grayson	1992	New York University Medical Center Institute of Reconstructive Plastic Surgery, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.046428571	979
7	Bisphosphonate-induced exposed bone (osteonecrosis/osteopetrosis) of the jaws: risk factors, recognition, prevention, and treatment	Robert E. Marx	Vishvasb Broumand	2005	Miller School of Medicine, Division of Oral and Maxillofacial Surgery, University of Miami, Miami, Fla.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.039070613	794
8	Platelet-rich plasma: evidence to support its use.	Robert E. Marx		2004	University of Miami School of Medicine and Jackson Memorial Hospital, Miami, Fla.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.06700702	754

(Continued)

Table 2. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
9	Fibula free flap: a new method of mandible reconstruction.	D. A. Hidalgo		1989	Division of Plastic and Reconstructive Surgery, Memorial Sloan-Kettering Cancer Center, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	-0.016783974	694
10	The vascular territories (angiosomes) of the body: experimental study and clinical applications.	G. I. Taylor	J. H. Palmer	1987	Royal Melbourne Hospital, and Department of Anatomy, University of Melbourne Australia	<i>British Journal of Plastic Surgery</i>	0.021912351	687
11	Functional evaluation of complete sciatic, peroneal, and posterior tibial nerve lesions in the rat.	J. R. Bain	D. A. Hunter	1989	University of Toronto, Ontario, Canada	<i>Plastic and Reconstructive Surgery</i>	-0.0101983	649
12	The free vascularized bone graft. A clinical extension of microvascular techniques.	G. I. Taylor	F. J. Ham	1975	Melbourne, Australia	<i>Plastic and Reconstructive Surgery</i>	0.246969697	622
13	The free thigh flap: a new free flap concept based on the septocutaneous artery.	Y. G. Song	Y. L. Song	1984	Beijing, People's Republic of China	<i>British Journal of Plastic Surgery</i>	0.14	574
14	Have we found an ideal soft-tissue flap? An experience with 672 anterolateral thigh flaps.	Fu-Chan Wei	Chih-Hung Lin	2002	Chang Gung Memorial Hospital, Taipei, Taiwan	<i>Plastic and Reconstructive Surgery</i>	-0.13681592	543
15	"Components separation" method for closure of abdominal-wall defects: an anatomic and clinical study.	O. M. Ramirez	A. L. Dellon	1990	Johns Hopkins University School of Medicine, Baltimore, Md.	<i>Plastic and Reconstructive Surgery</i>	0.260773481	536
16	Breast reconstruction with a transverse abdominal island flap.	C. R. Hartrampf	P. W. Black	1982	Atlanta, Ga. + Medical College of Virginia, Richmond, Va.	<i>Plastic and Reconstructive Surgery</i>	0.270416025	526
17	Deep inferior epigastric perforator flap for breast reconstruction.	R. J. Allen	P. Treecce	1994	Louisiana State University Medical Center, Stanley S. Scott Cancer Center, New Orleans	<i>Annals of Plastic Surgery</i>	-0.101567398	520
18	American Association of Oral and Maxillofacial Surgeons position article on bisphosphonate-related osteonecrosis of the jaws—2009 update.	Salvatore L. Ruggiero	Bhoomi Mehrotra	2009	Division of Oral and Maxillofacial Surgery, Stony Brook School of Dental Medicine, Long Island Jewish Medical Center, New Hyde Park, N.Y.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.035806452	517
19	Inferior epigastric artery skin flaps without rectus abdominis muscle.	I. Koshima	S. Soeda	1989	University of Tsukuba, Ibaraki, Japan	<i>British Journal of Plastic Surgery</i>	0.412451362	502
20	Osteoradionecrosis: a new concept of its pathophysiology.	R. E. Marx		1983	Wilford Hall USAF Medical Center, San Antonio, Tex.	<i>Journal of Oral Maxillofacial Surgery</i>	0.267496112	497
21	American Association of Oral and Maxillofacial Surgeons position article on medication-related osteonecrosis of the jaw—2014 update.	Salvatore L. Ruggiero		2014	Stony Brook School of Dental Medicine, Hofstra North Shore-LIJ School of Medicine, New York Center for Orthognathic and Maxillofacial Surgery, Lake Success, N.Y.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.000134372	487
22	Platelet quantification and growth factor analysis from platelet-rich plasma: implications for wound healing.	Barry L. Eppley	Joel Higgins	2004	Indiana University School of Medicine, Indianapolis	<i>Plastic and Reconstructive Surgery</i>	0.019706499	464
23	Facial recontouring with liposuction.	S. R. Coleman		1997	New York, N.Y.	<i>Clinics in Plastic Surgery</i>	-0.040733198	460
24	Structural fat grafting: more than a permanent filler.	Sydney R. Coleman		2006	New York University School of Medicine, New York	<i>Plastic and Reconstructive Surgery</i>	-0.008598131	456
25	The pectoralis major myocutaneous flap. A versatile flap for reconstruction in the head and neck.	S. Ariyan		1979	Yale University, New Haven, Conn.	<i>Plastic and Reconstructive Surgery</i>	0.321628093	450
26	Healing of bone defects by guided tissue regeneration.	C. Dahlin	S. Nyman	1988	Gothenburg University, Sweden	<i>Plastic and Reconstructive Surgery</i>	0.037960123	442
27	Clinical treatment of radiotherapy tissue damage by liposarcoma transplant: a healing process mediated by adipose-derived adult stem cells.	Gino Rigotti	Andrea Sbarbati	2007	Ospedale Maggiore di Verona, Verona, Italy	<i>Plastic and Reconstructive Surgery</i>	0.001683164	441

(Continued)

Table 2. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
28	International clinical recommendations on scar management.	Thomas A. Mustoe	Ulrich E. Ziegler	2002	Northwestern University School of Medicine, Chicago, Ill.	<i>Plastic and Reconstructive Surgery</i>	-0.043637387	427
29	Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q.	Andrea L. Pusic	Stefan J. Cano	2009	Memorial Sloan-Kettering Cancer Center, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	0.041296061	415
30	The radial forearm flap: a versatile method for intra-oral reconstruction.	D. S. Soutar	I. A. McGregor	1983	Glasgow, Scotland	<i>British Journal of Plastic Surgery</i>	0.294749403	411
31	On the nature of hypertrophic scars and keloids: a review.	F. B. Niessen	M. Kon	1999	University Hospital of Groningen, The Netherlands	<i>Plastic and Reconstructive Surgery</i>	-0.008386118	409
32	Reliability and validity testing of the Michigan Hand Outcomes Questionnaire.	K. C. Chung	R. A. Hayward	1998	University of Michigan Medical Center, Ann Arbor	<i>Journal of Hand Surgery (American)</i>	-0.000243694	399
33	Cell-assisted lipotransfer for cosmetic breast augmentation: supportive use of adipose-derived stem/stromal cells.	Kotaro Yoshimura	Kiyonori Harii	2008	University of Tokyo School of Medicine, Tokyo, Japan	<i>Aesthetic Plastic Surgery</i>	-0.029148409	397
34	The patient and observer scar assessment scale: a reliable and feasible tool for scar evaluation.	Lieneke J. Draaijers	Paul P. M. van Zuiflen	2004	Beverwijk, the Netherlands	<i>Plastic and Reconstructive Surgery</i>	0.008187687	369
35	Oral bisphosphonate-induced osteonecrosis: risk factors, prediction of risk using serum CTX testing, prevention, and treatment.	Robert E. Marx	Juan J. Ulloa	2007	Division of Oral and Maxillofacial Surgery, University of Miami Miller School of Medicine, Miami, Fla.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.035548686	362
36	Donor-site morbidity after harvesting rib and iliac bone.	S. W. Laurie	J. E. Murray	1984	Harvard Medical School, Boston, Ma.	<i>Plastic and Reconstructive Surgery</i>	0.350591716	361
37	The osteocutaneous scapular flap for mandibular and maxillary reconstruction.	W. M. Swartz	R. Acland	1986	University of Pittsburgh, Pittsburgh, Pa.	<i>Plastic and Reconstructive Surgery</i>	0	339
38	The donor site morbidity of free DIEP flaps and free TRAM flaps for breast reconstruction.	N. Blondeel	G. Matton	1997	University Hospital Gent, Belgium	<i>British Journal of Plastic Surgery</i>	-0.059577677	337
39	Membranous versus endochondral bone: implications for craniofacial reconstruction.	J. E. Zins	L. A. Whitaker	1983	Philadelphia, Pa.	<i>Plastic and Reconstructive Surgery</i>	0.117415976	333
40	Nature and frequency of bisphosphonate-associated osteonecrosis of the jaws in Australia.	Tony Mavrokokki	Alastair Goss	2007	Adelaide Dental Hospital and University of Adelaide, Adelaide, South Australia.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.044290449	327
41	Platelet gel: an autologous alternative to fibrin glue with applications in oral and maxillofacial surgery.	D. H. Whitman	D. M. Green	1997	David Grant Medical Center, Travis Air Force Base, Calif.	<i>Journal of Oral Maxillofacial Surgery</i>	0.163679809	323
42	Cranio-maxillofacial trauma: a 10-year review of 9543 cases with 21,067 injuries.	Robert Gassner	Hanno Ulmer	2003	Department of Oral and Maxillofacial Surgery, University of Innsbruck, Austria	<i>Journal of Craniomaxillofacial Surgery</i>	-0.007759457	319
43	Autologous stem cells (adipose) and fibrin glue used to treat widespread traumatic calvarial defects: case report	Stefan Lendeckel	Hans-Peter Howaldt	2004	Justus-Liebig-University Medical School, Gessen, Germany	<i>Journal of Craniomaxillofacial Surgery</i>	-0.008742911	315
44	A paradigm shift in U.S. Breast reconstruction: increasing implant rates.	Claudia R. Albornoz	Evan Matros	2013	Memorial Sloan-Kettering Cancer Center, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	-0.004150526	310
45	Distraction osteogenesis in maxillofacial surgery using internal devices: review of five cases.	M. Chin	B. A. Toth	1996	California Pacific Medical Center, San Francisco, Calif.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.035775128	307

(Continued)

Table 2. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
46	Transplantation of chondrocytes utilizing a polymer-cell construct to produce tissue-engineered cartilage in the shape of a human ear.	Y. Cao	C. A. Vacanti	1997	Department of Surgery, Children's Hospital, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	0.088682432	302
47	Skin island flaps supplied by the vascular axis of the sensitive superficial nerves: anatomic study and clinical experience in the leg.	A. C. Masquelet	G. Wolf	1992	Hôpital Avicenne, Paris, France	<i>Plastic and Reconstructive Surgery</i>	-0.004977876	300
48	Breast reconstruction after mastectomy using the temporary expander.	C. Radovan	S. Torii	1982	Encino, California	<i>Plastic and Reconstructive Surgery</i>	0.398921833	298
49	Free gracilis muscle transplantation, with microvascular anastomoses for the treatment of facial paralysis. A preliminary report.	K. Harii	S. Torii	1976	Tokyo, Japan	<i>Plastic and Reconstructive Surgery</i>	0.240137221	296
50	Complications in postmastectomy breast reconstruction: two-year results of the Michigan Breast Reconstruction.	Amy K. Alderman	Julie C. Lowery	2002	The University of Michigan Medical Center, Ann Arbor, Mich.	<i>Plastic and Reconstructive Surgery</i>	0.019320453	296
51	One hundred free DIEP flap breast reconstructions: a personal experience.	P. N. Blondeel		1999	University Hospital Gent, Belgium	<i>British Journal of Plastic Surgery</i>	-0.081786942	296
52	A 25-year perspective of peripheral nerve surgery: evolving neuroscientific concepts and clinical significance.	G. Lundborg		2000	Malmö University Hospital, Sweden	<i>Journal of Hand Surgery (American)</i>	-0.005474551	293
53	A 10-year retrospective review of 758 DIEP flaps for breast reconstruction.	Paul S. Gill	Robert J. Allen	2004	Louisiana State University Health Sciences Center, New Orleans, La.	<i>Plastic and Reconstructive Surgery</i>	-0.058704453	292
54	Mandibular lengthening by gradual distraction. Preliminary report.	C. C. Snyder	E. Z. Browne Jr	1973	Veterans Administration Hospital, Salt Lake City, Utah	<i>Plastic and Reconstructive Surgery</i>	0.474725275	290
55	Clinical nerve reconstruction with a bioabsorbable polyglycolic acid tube.	S. E. Mackinnon	A. L. Dellon	1990	University of Toronto Sunnybrook Medical Center, Ontario	<i>Plastic and Reconstructive Surgery</i>	-0.04	289
56	The subunit principle in nasal reconstruction.	G. C. Burget	F. J. Menick	1985	Chicago, Ill.	<i>Plastic and Reconstructive Surgery</i>	0.244604317	288
57	Synthetic polymers seeded with chondrocytes provide a template for new cartilage formation.	C. A. Vacanti	J. P. Vacanti	1991	Massachusetts General Hospital, Boston	<i>Plastic and Reconstructive Surgery</i>	0.006523499	287
58	Structural fat grafts: the ideal filler?	S. R. Coleman		2001	Manhattan Eye, Ear, and Throat Hospital, New York, N.Y.	<i>Clinics in Plastic Surgery</i>	-0.028795812	287
59	Mandibular elongation and remodeling by distraction: a farewell to major osteotomies.	F. Molina	F. Ortiz Monasterio	1995	Universidad Nacional Autónoma de Mexico, Mexico City	<i>Plastic and Reconstructive Surgery</i>	-0.119821542	286
60	A prospective study of microvascular free-flap surgery and outcome.	R. K. Khouri	C. Wallemark	1998	Miami Hand Center, Fla.	<i>Plastic and Reconstructive Surgery</i>	0.001478561	283
61	Vacuum-assisted closure: microdeformations of wounds and cell proliferation.	Vishal Saxena	Dennis P. Orgill	2004	Massachusetts Institute of Technology, Cambridge, Mass.	<i>Plastic and Reconstructive Surgery</i>	-0.020012129	279
62	Growth factor levels in platelet-rich plasma and correlations with donor age, sex, and platelet count.	Gernot Weibrich	Walter E. Hitzler	2002	Johannes Gutenberg University Mainz, Germany	<i>Journal of Craniomaxillofacial Surgery</i>	-0.01010101	278
63	Fat grafting to the breast revisited: safety and efficacy.	Sydney R. Coleman	Alesia P. Sabociro	2007	New York University School of Medicine, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	-0.006464884	274
64	Foreign body reactions to resorbable poly(L-lactide) bone plates and screws used for the fixation of unstable zygomatic fractures.	E. J. Bergsma	W. C. de Bruijn	1993	University Hospital, Groningen, the Netherlands	<i>Journal of Oral Maxillofacial Surgery</i>	0.023038157	271

(Continued)

Table 2. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
65	Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty.	J. H. Sheen		1984	UCLA, Los Angeles, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.760869565	267
66	Anatomic variations and technical problems of the anterolateral thigh flap: a report of 74 cases.	Y. Kimata	K. Harii	1998	National Cancer Center Hospital East, Kashiwa, Chiba, Japan	<i>Plastic and Reconstructive Surgery</i>	-0.18245614	267
67	Functional wrist motion: a biomechanical study.	A. K. Palmer	R. Glisson	1985	Upstate Medical Center, Syracuse, N.Y.	<i>Journal of Hand Surgery (American)</i>	0.184087363	266
68	Volar fixation for dorsally displaced fractures of the distal radius: a preliminary report.	Jorge L. Orbay	Diego L. Fernandez	2002	Miami Hand Center, Miami, Fla.	<i>Journal of Hand Surgery (American)</i>	-0.072820513	266
69	The vascular territories of the superior epigastric and the deep inferior epigastric systems.	J. B. Boyd	R. Corlett	1984	Melbourne, Australia	<i>Plastic and Reconstructive Surgery</i>	-0.048589342	264
70	Body contouring by lipolysis: a 5-year experience with over 3000 cases.	Y. G. Illouz		1983	Paris, France	<i>Plastic and Reconstructive Surgery</i>	0.823741007	263
71	Immediate bilateral breast reconstruction with implants and inferolateral AlloDerm slings.	Karl H. Breuing	Stephen M. Warren	2005	Brigham and Women's Hospital, Harvard Medical School, Boston, Mass.	<i>Annals of Plastic Surgery</i>	0.002224694	259
72	A randomized prospective study of polyglycolic acid conduits for digital nerve reconstruction in humans.	R. A. Weber	D. P. Mass	2000	Scott & White Memorial Hospital and Clinic, Temple, Tex.	<i>Plastic and Reconstructive Surgery</i>	-0.037142857	259
73	Historical review and present status of free fat graft autotransplantation in plastic and reconstructive surgery.	E. Billings Jr	J. W. May Jr	1989	Massachusetts General Hospital, Boston	<i>Plastic and Reconstructive Surgery</i>	0.010935252	253
74	Keloid pathogenesis and treatment.	Ali Al-Attrar	Steven P. Davison	2006	Georgetown University Medical Center, Washington, D.C.	<i>Plastic and Reconstructive Surgery</i>	-0.01314012	252
75	A new concept in the treatment of osteoradionecrosis.	R. E. Marx		1983	Wilford Hall USAF Medical Center, Lackland AFB, Tex.	<i>Journal of Oral Maxillofacial Surgery</i>	-0.039757995	250
76	Implant-based breast reconstruction using acellular dermal matrix and the risk of postoperative complications.	Yoon S. Chun	Elof Eriksson	2010	Harvard Medical School, Brigham and Women's Hospital/Faulkner Hospital, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	-0.176151762	248
77	Distant transfer of an island flap by microvascular anastomoses. A clinical technique.	R. K. Daniel	G. I. Taylor	1973	Melbourne, Australia	<i>Plastic and Reconstructive Surgery</i>	0.147027027	244
78	The frequency and epidemiology of hand and forearm fractures in the United States.	K. C. Chung	S. V. Spilson	2001	The University of Michigan Medical Center, Ann Arbor, Mich.	<i>Journal of Hand Surgery (American)</i>	0.135831382	241
79	Free anterolateral thigh flaps for reconstruction of head and neck defects.	I. Koshima	S. Ohta	1993	Reconstructive Surgery, Kawasaki Medical School, Okayama, Japan.	<i>Plastic and Reconstructive Surgery</i>	-0.088673621	241
80	Volar fixed-angle plate fixation for unstable distal radius fractures in the elderly patient.	Jorge L. Orbay	Diego L. Fernandez	2004	Miami Hand Center, Miami, Fla.	<i>Journal of Hand Surgery (American)</i>	-0.098630137	240
81	Modified skin incisions for mastectomy: the need for plastic surgical input in preoperative planning.	B. A. Toth	P. Lappert	1991	Pacific Presbyterian Medical Center, San Francisco, Calif.	<i>Plastic and Reconstructive Surgery</i>	0.134067952	239
82	Human histology and persistence of various injectable filler substances for soft tissue augmentation.	Gottfried Lempertle	Ulrich Charrier	2003	University of California, San Diego, Calif.	<i>Aesthetic Plastic Surgery</i>	-0.012070006	239
83	Fibular osteoseptocutaneous flap: anatomic study and clinical application.	F. C. Wei	M. S. Noordhoff	1986	Taipei, Taiwan	<i>Plastic and Reconstructive Surgery</i>	-0.003925967	238

(Continued)

Table 2. Continued

Rank	Title	First Author	Senior Author	Year	Affiliation	Journal	DS	Citation Count
84	Myogenic differentiation by human processed liposariparite cells.	Hiroshi Mizuno	Marc H. Hedrick	2002	University of California-Los Angeles School of Medicine	<i>Plastic and Reconstructive Surgery</i>	-0.008084971	238
85	Temporomandibular joint arthrocentesis: a simplified treatment for severe, limited mouth opening.	D. W. Nitzan	G. A. Martinez	1991	Hebrew University-Fladassah School of Dental Medicine, Jerusalem, Israel	<i>Journal of Oral Maxillofacial Surgery</i>	-0.007383479	238
86	Vaginal reconstruction with gracilis myocutaneous flaps.	J. B. McCraw	C. E. Horton	1976	Norfolk, Va.	<i>Plastic and Reconstructive Surgery</i>	0.627071823	234
87	Relative antigenicity of components of a vascularized limb allograft.	W. P. Lee	A. J. Weiland	1991	Johns Hopkins University School of Medicine, Baltimore, Md.	<i>Plastic and Reconstructive Surgery</i>	-0.001562907	233
88	Cleft palate repair by double opposing Z-plasty.	L. T. Furlow Jr.	L. T. Furlow	1986	Gainesville, Fla.	<i>Plastic and Reconstructive Surgery</i>	-0.017902813	232
89	Acellular dermis-assisted breast reconstruction.	S. L. Spear	N. G. Menon	2008	Georgetown University, Washington, DC	<i>Reconstructive Surgery</i>	-0.127725857	230
90	Breast Reconstruction with the free TRAM or DIEP flap: patient selection, choice of flap, and outcome.	Maurice Y. Nahabedian	Paul N. Manson	2002	Johns Hopkins Medical Institutions, Baltimore, Md.	<i>Plastic and Reconstructive Surgery</i>	-0.088586031	229
91	Prospective analysis of psychosocial outcomes in breast reconstruction: one-year postoperative results from the Michigan reconstruction outcome study.	E. G. Wilkins	K. W. Shaheen	2000	University of Michigan Health System, Ann Arbor	<i>Plastic and Reconstructive Surgery</i>	-0.000883246	227
92	The definitive plastic surgical treatment of the severe facial deformities of craniofacial dysostosis. Crouzon's and Apert's diseases.	P. Tessier		1971	Paris, France	<i>Plastic and Reconstructive Surgery</i>	0.071197411	226
93	Bone regeneration within a coralline hydroxyapatite implant.	R. E. Holmes		1979	University of Texas, Dallas, Tex.	<i>Plastic and Reconstructive Surgery</i>	0.078222778	224
94	Responsiveness of the short form-36, disability of the arm, shoulder, and hand questionnaire, patient-rated wrist measurements in evaluating recovery after a distal radius fracture.	J. C. MacDermid	J. H. Roth	2000	St. Joseph's Health Centre, London, Ontario, Canada	<i>Journal of Hand Surgery (American)</i>	-0.012558512	223
95	The use of vacuum-assisted closure therapy for the treatment of lower-extremity wounds with exposed bone.	A. J. DeFranzo	R. G. Teasdall	2001	Wake Forest University School of Medicine, Winston-Salem, N.C.	<i>Plastic and Reconstructive Surgery</i>	-0.062587904	223
96	The levels of evidence and their role in evidence-based medicine.	Patricia B. Burns	Kevin C. Chung	2011	University of Michigan Health System, Ann Arbor, Mich.	<i>Plastic and Reconstructive Surgery</i>	0.000240154	222
97	Keloids and hypertrophic scars: a comprehensive review.	W. B. Rockwell	H. P. Ehrlich	1989	Massachusetts General Hospital, Boston, Mass.	<i>Plastic and Reconstructive Surgery</i>	-0.012576687	222
98	The vascular anatomy of rectus abdominis musculocutaneous flaps based on the deep superior epigastric system.	H. K. Moon	G. I. Taylor	1988	Cleveland Clinic Foundation, Ohio	<i>Plastic and Reconstructive Surgery</i>	-0.063380282	222
99	Transplantation of purified autologous fat: a 3-year follow-up is disappointing.	R. A. Ersek		1991	Southwest Texas State University	<i>Plastic and Reconstructive Surgery</i>	0.134969325	221
100	Reconstruction of the mandible with osseous free flaps: a 10-year experience with 150 consecutive patients.	P. G. Cordeiro	Q. Y. Hu	1999	Memorial Sloan-Kettering Cancer Center, New York, N.Y.	<i>Plastic and Reconstructive Surgery</i>	-0.031496063	215

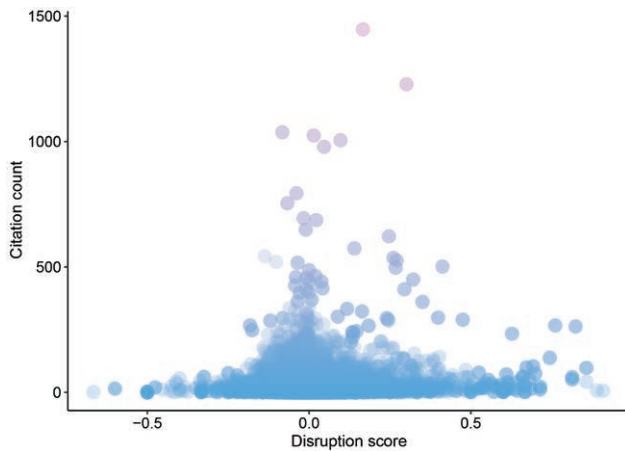


Fig. 2. Scatterplot of citation counts by DSs for all plastic surgery articles.

RESULTS

A kernel plot for the DSs of the 12,742,382 PubMed-indexed articles (1954–2014) across all specialties is shown in Figure 1. For our analysis, a total of n = 53,507 articles were identified, n = 15,759 in PRS, n = 6,276 in *Annals of Plastic Surgery*, n = 5467 in *British Journal of Plastic Surgery* (currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*), n = 7843 in *Journal of Oral and Maxillofacial Surgery*, n = 1770 in *Journal of Craniomaxillofacial Surgery*, n = 3496 in *Journal of Craniofacial Surgery*, n = 1937 in *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery*, n = 1104 in *Clinics in Plastic Surgery*, n = 3691 in *Journal of Hand Surgery (American)*, n = 2463 in *Journal of Hand Surgery (European/British)*, n = 406 in *Aesthetic Surgery Journal*, n = 450 in *JAMA Facial Plastic Surgery*, n = 1225 in *Journal of Reconstructive Microsurgery*, and n = 1620 in *Aesthetic Plastic Surgery*. The 100 most-disruptive articles in plastic and reconstructive surgery and sub-specialties are presented in Table 1. For comparison, the top 100 most-cited articles in these journals is presented in Table 2. The top five including nine of the top 10 most-disruptive articles were published in PRS. Additionally 21 of the top 30, and 64 of the total list of 100

Table 3. Number of Articles in the Top 100 Most-disruptive Articles by Journal

Journal	No. Articles in Top 100
1. <i>Plastic and Reconstructive Surgery</i>	64
2. <i>British Journal of Plastic Surgery</i>	15
3. <i>Journal of Oral and Maxillofacial Surgery</i>	7
4. <i>Annals of Plastic Surgery</i>	6
5. <i>Journal of Hand Surgery (American)</i>	3
6. <i>Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery</i>	2
7. <i>Journal of Hand Surgery (European/British)</i>	1
8. <i>Clinics in Plastic Surgery</i>	1
9. <i>Journal of Craniomaxillofacial Surgery</i>	1
10. <i>Aesthetic Surgery Journal</i>	0
11. <i>Aesthetic Plastic Surgery</i>	0
12. <i>Journal of Craniofacial Surgery</i>	0
13. <i>JAMA Facial Plastic Surgery</i>	0
14. <i>Journal of Reconstructive Microsurgery</i>	0

appeared in the same journal. The second-most articles on the list appeared in *British Journal of Plastic Surgery* (currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*) (n = 15), third-most in *Journal of Oral and Maxillofacial Surgery* (n = 7), fourth-most in *Annals of Plastic Surgery* (n = 6), followed by *Journal of Hand Surgery (American)* (n = 3), *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery* (n = 2), *Journal of Hand Surgery (European/British)* (n = 1), *Clinics in Plastic Surgery* (n = 1), and *Journal of Craniomaxillofacial Surgery* (n = 1) (Table 3). There were no articles from either *Journal of Reconstructive Microsurgery*, *Journal of Craniofacial Surgery*, *JAMA Facial Plastic Surgery*, *Aesthetic Plastic Surgery* or *Aesthetic Surgery Journal* in the top 100. The top 100 most-disruptive publications in these journals were more disruptive than 99.8% of all PubMed articles. Citation counts of the 100 most-disruptive articles ranged from 1 to 502 (mean = 44.9 citations). The correlation coefficient linking DSs and citation counts was 0.01 and 0.11 among all articles, and the 100 most-disruptive articles, respectively.

Figure 2 displays a scatterplot of DSs by citation count for all plastic surgery articles, and Figure 3 displays a kernel density plot of DSs by journal. Mean DSs by journal are presented in Table 4. The highest mean DS was in *Clinics in Plastic Surgery* and PRS. The average PRS, *Annals of Plastic*

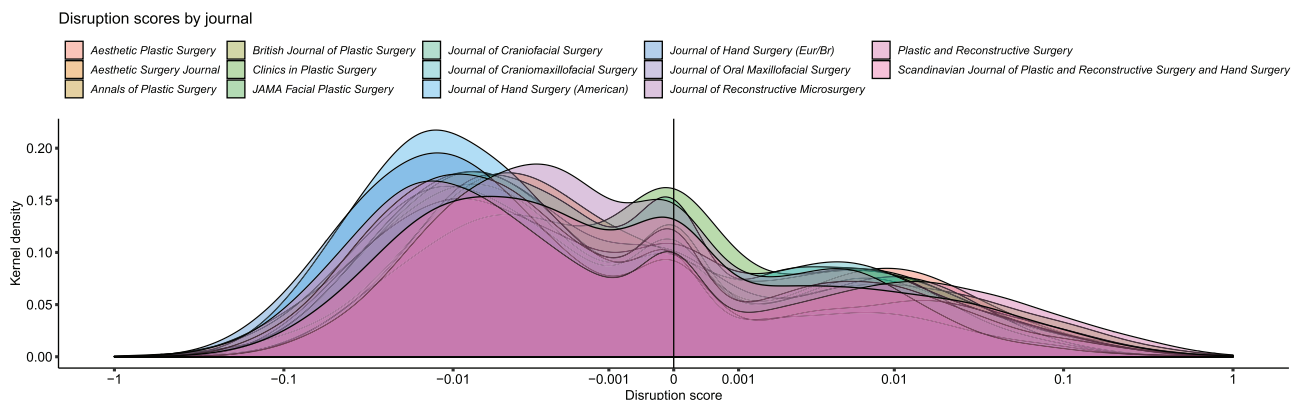


Fig. 3. Distribution of disruption scores by individual journal (1954–2014). Negative values indicate developmental articles, and positive values indicate disruptive articles. Note: *British Journal of Plastic Surgery* is currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*.

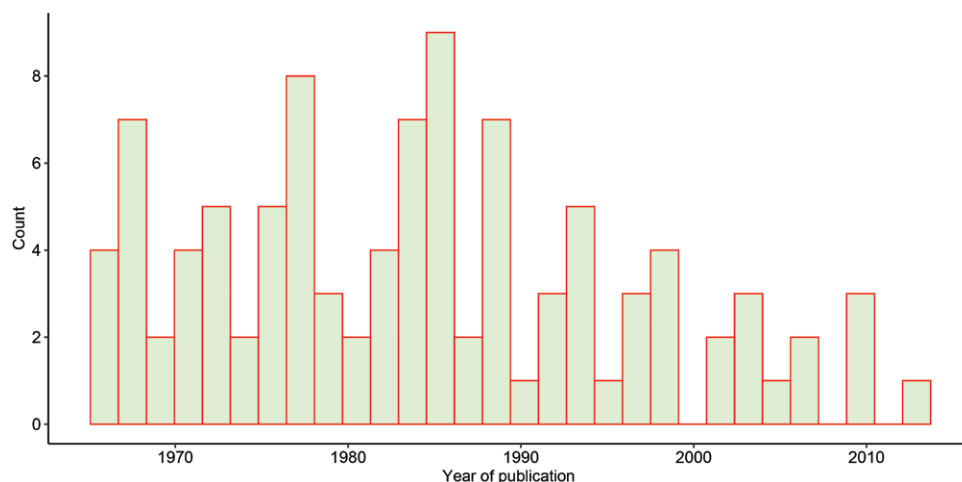


Fig. 4. Histogram of publication year among the top 100 most-disruptive articles.

Surgery, *British Journal of Plastic Surgery* (currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*), *Journal of Oral and Maxillofacial Surgery*, *Journal of Craniomaxillofacial Surgery*, *Journal of Craniofacial Surgery*, *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery*, *Clinics in Plastic Surgery*, *Journal of Hand Surgery (American)*, *Journal of Hand Surgery (European/British)*, *Aesthetic Surgery Journal*, *JAMA Facial Plastic Surgery*, *Journal of Reconstructive Microsurgery*, and *Aesthetic Plastic Surgery* article was more disruptive than 81%, 33%, 42%, 22%, 36%, 38%, 77%, 88%, 10%, 12%, 38%, 26%, 34%, and 23% of all PubMed articles, respectively.

Figure 4 displays publication year histogram for the top 100 most-disruptive articles. The most common decade represented was the 1980s ($n = 31$), and the least common was 2000s ($n = 9$). The mean DS for the 1960s, 1970s, 1980s, 1990s, and the 2000s was 0.59, 0.55, 0.53, 0.55, and 0.55, respectively. With respect to study types, there are notable differences between the focus of the most-disruptive and the most-cited articles. The most common study types in the most-disruptive list were methodological studies ($n = 32$), case reports/series ($n = 31$), and reviews ($n = 19$), whereas for the most-cited list, they were case reports/series ($n = 33$), reviews ($n = 17$), and novel surgical techniques ($n = 9$).

Table 4. Mean DSs by Journal

Journal	Mean DSs
1. <i>Clinics in Plastic Surgery</i>	0.0029
2. <i>Plastic and Reconstructive Surgery</i>	0.0005
3. <i>Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery</i>	0.00003
4. <i>British Journal of Plastic Surgery</i>	-0.0015
5. <i>Aesthetic Surgery Journal</i>	-0.0018
6. <i>Journal of Craniofacial Surgery</i>	-0.0018
7. <i>Journal of Craniomaxillofacial Surgery</i>	-0.0021
8. <i>Journal of Reconstructive Microsurgery</i>	-0.0023
9. <i>Annals of Plastic Surgery</i>	-0.0025
10. <i>JAMA Facial Plastic Surgery</i>	-0.0039
11. <i>Aesthetic Plastic Surgery</i>	-0.0048
12. <i>Journal of Oral and Maxillofacial Surgery</i>	-0.0049
13. <i>Journal of Hand Surgery (European/British)</i>	-0.010
14. <i>Journal of Hand Surgery (American)</i>	-0.0124

DISCUSSION

This is the first study to apply the disruption index to the field of plastic and reconstructive surgery. We present in the current study a list of the top 100 most-disruptive studies appearing in 14 of the most popular journals in plastic surgery (1954–2014). In our analysis, we found that DSs correlated poorly with citation count. This finding underscores that the disruption metric may capture unique characteristics of paradigm-shifting studies that may be overlooked when favoring citation count. This list contains some of the most infamous and practice-altering articles in the history of our specialty.

The most-disruptive article appearing on the list, “Minimally Invasive, Limited Incision Breast Surgery: Passing Fad or Emerging Trend?” was published by Rod J. Rohrich in *PRS* in 2002.¹⁵ This “Cosmetic Viewpoint” starts by quoting Albert Einstein: “Problems cannot be solved at the same level of awareness that created them” and discusses what were at the time recent trends in minimally invasive breast surgery, breast liposuction, and limited incision mastopexy/breast reduction.

The second-most disruptive article published in 1966 in *PRS* was “The Ultimate Fate of Freeze Dried Fascia: Experience with its Use in the Correction of Facial Paralysis.”¹⁶ In this report, Snyderman et al discussed their positive experience in 15 patients treated with freeze-dried fascia for facial palsy. To that point, the use of fresh autologous fascia was standard until the authors benefited from the advent of a tissue bank in 1953 at the Memorial Sloan Kettering Cancer Center.

The third-most disruptive article by Ulrich and Meyer “A Suction Curette for Removal of Excessive Local Deposits of Subcutaneous Fat” appeared in *PRS* in 1978 and was the first documented report on the use of liposuction.¹⁷ This study described the authors’ transition from what was at the point the standard method of removal of localized fat deposits by curette through a small incision in select areas (eg, trochanteric lipodystrophy) to their use of a stainless steel suction curette (devised by Ulrich) to “treat fat deposits elsewhere (eg, stomach, thighs, calves, knees).” This report appeared a few years after Arpad and

Giorgio Fischer first started using a blunt suction-assisted cannula to treat fat deposits of the outer thighs.¹⁸

The fourth-most disruptive study is the 1998 study by Schneider, Morykwas, and Argenta “A New and Reliable Method of Securing Skin Grafts to the Difficult Recipient Bed.”¹⁹ This PRS study described their experience with the Vacuum Assisted Closure device (KCI: San Antonio, Tex.) for skin graft to wound bed apposition in place of the traditional tie-over bolster method.

The fifth-most disruptive study is also the fourth-most cited on the list. This 1985 PRS study by Illouz titled “Body Contouring by Lipolysis: A 5-Year Experience with Over 3000 Cases” presented the author’s experience with liposuction body contouring and subsequent surgical correction of the deformity resulting from overlying skin contraction.²⁰

It is also worth noting that the sixth-most disruptive 1967 study by Brunner describing “The Zig-Zag Volar-Digital Incision for Flexor Tendon Surgery” has for over 50 years been the incision-of-choice for flexor tendon and volar digital exposure.²¹ Other notable works appearing in the top 10 include a 1979 large-volume review of palatal fistulae by Abyholm et al (“Palatal Fistulae Following Cleft Palate Surgery” in *Scandinavian Journal of Plastic and Reconstructive Surgery and Hand Surgery*²²), the first description in 1984 by Sheen of the now ubiquitous spreader graft in rhinoplasty (“Spreader Graft: A Method of reconstructing the Roof of the Middle Nasal Vault Following Rhinoplasty” in PRS²³), McKissock’s 1972 description of his now eponymous breast reduction technique (“Reduction Mammoplasty with a Vertical Dermal Flap” in PRS²⁴), and finally the 1969 Australian study by Snell and Dott advocating for widespread use of plating in mandibular fractures (“Internal Fixation of Certain Fractures of the Mandible by Bone Plating” in PRS²⁵).

The most-cited study (n = 502 citations, 91st on the list of most-disruptive studies) is the 1989 case report by Koshima et al entitled “Inferior Epigastric Artery Skin Flaps Without Rectus Abdominis Muscle” published in the *British Journal of Plastic Surgery* (currently *Journal of Plastic, Reconstructive & Aesthetic Surgery*).²⁶ This now infamous article was the first description of the deep inferior epigastric artery perforator (DIEP) flap, which has since become the gold-standard for autologous free flap breast reconstruction at many centers around the world. The current authors would like to stress that all articles in the top 100 are highly disruptive studies. Although, in theory, the number one article on the list is more disruptive than the fifth, which are both more disruptive than all the studies appearing lower, the list is meant to be viewed as a body rather than as a consecutive ranking. The study by Koshima et al²⁶ is one of the most revolutionary studies in the history of plastic surgery, and because it was identified at the top 100, the current authors believe that this is evidence of the merit of this novel bibliometric. Moreover, although many of the articles appearing in the most-disruptive list also carried high citation counts, many did not (n = 25 articles had <10 citations). This finding is similar to the study by Becerra et al investigating disruption in

academic surgery, in which 23 of their top 100 also had <10.¹¹

The most common decade of disruption in the top 100 was the 1980s, with 31 articles at the top 100. Although the World Wars and the following decades certainly were integral in the development of plastic surgery,²⁷ the 1980s saw an explosion of innovation in part due to technological advances in plastic surgery and surgery more generally.²⁸ However, notably, the 1980s had the lowest average DS (0.53), with the 1960s having the highest average DS (0.59) of the decades included in our analysis. The 2000s had the fewest appearances on the list of top 100 with 9 articles, although, as previously discussed, the most-disruptive article was published in 2002 by Rohrich.¹⁵

The list of the most-disruptive articles also contains a broad diversity of topics and study designs. In fact, the broad range of topics was so variable that it precluded analysis. However, data on study design are presented with the most common type of study on the disruptive list—methodological studies (n = 32), whereas that for the most-cited list was case report/series (n = 33). Although case reports/series were also relatively common on the disruptive list (n = 31), there were very few methodological studies appearing in the most-cited list (n = 6). Although one may expect a list of the most paradigm-shifting studies in plastic surgery to feature a long list of high level of evidence randomized controlled trials, our results are similar to the results of other studies, including the Nature study by Wu et al,⁵ which initially investigated the disruption bibliometric. They concluded that small teams disrupt, but large teams develop. In both the most-disruptive and most-cited lists in the current study, a large number of case series and case reports seem to highlight this phenomenon: that these types of studies may report on novel concepts that serve to introduce a topic/finding to the wider surgical community and then serves as a foundation for larger, higher level of evidence studies to investigate novel findings. The current authors would also like to stress that the disruption metric is not synonymous with the dictionary definition of the word disruption, which carries its own connotations and may lead to misinterpretation of this bibliometric. Rather, we recommend the reader to focus on the definition of disruption, as outlined in the Methods section and the equation described. Furthermore, although some highly disruptive studies may change clinical practice, many do not. The mean feature of the disruption index is identifying articles that supplant previous literature on a given topic. Moreover, although some of these studies changed clinical practice, all of the highly-disruptive articles share the characteristic that they shifted paradigms in a given topic, as evidenced by shifting citations from previous literature to the index study after publication.

The DS serves as an alternative and complimentary tool to the citation count, which although simple and pragmatic, may not capture all scopes of innovation for quantifying scholarly impact. With the continued explosion of scientific literature, bibliometric measurements have become increasingly important to analyze

and rank academic productivity.²⁹ Academic plastic surgery is an exceedingly competitive field and bibliometric measurements are frequently also used for promotion.³⁰ Although citation count or bibliographic indices derived thereof (h-index and g-index) are often used as a proxy for scholarly impact, these metrics have notable limitations.³ Several recent studies^{9,10} have investigated alternative bibliometrics in plastic surgery, including the Altmetric score. Shiah et al compared the Altmetric score with “traditional” citation-based metrics such as the Hirsch index (H-index) and concluded that the Altmetric score has a weak positive correlation with conventional bibliometrics.⁹ Another recent study by Ruan et al investigated the relationship among the Altmetric score, Mendeley reader score, citation count, and downloads in *PRS*, and described the merits of the Altmetric score but discouraged its use as a stand-alone bibliometric.¹⁰

This study carries several limitations. Our analysis was conducted in 14 plastic and reconstructive surgery journals. Thus, articles published in other plastic surgery journals, or high-impact journals such as general surgery or medicine are excluded. Additionally, DSs and citation counts, like all bibliometrics, change over time as new scientific literature is published, and this analysis provides a snapshot in time of the current bibliometrics. Additionally, older studies are theoretically favored by this metric (as with other metrics) as they have had more time to aggregate citations. The favoring effect is likely counterbalanced by the fact that outdated studies eventually are less likely to be read or cited due to the dramatic changes that surgery is constantly undergoing. Despite these limitations, this study provides an important contribution to the plastic surgery literature by providing a repository of disruptive plastic surgery articles that may have otherwise been overlooked using traditional bibliometric tools. Future work will focus on comparing the disruption index with other alternative metrics such as Altmetric score, H-index, Mendeley reader score, and download counts.

CONCLUSIONS

We present the 100 most-disruptive articles in 14 of the most popular plastic surgery journals published between 1954 and 2014, utilizing a novel bibliometric index. A detailed analysis of these studies, including correlation to citation counts and analysis of publication years, is also presented. To our knowledge, this is the first application of the disruption metric to plastic surgery and its subspecialties. This review provides a unique perspective on the seminal research studies that shifted paradigms and pushed forward surgical innovations that have made plastic surgery what it is today. We hope this perspective will provide plastic, reconstructive, and subspecialty surgeons an understanding of how current and historical innovations have made a lasting impact on the field of plastic surgery and provide insight into how current and future studies may further shape the field in ways we have yet to observe.

Adan Z. Becerra, PhD

Rush University Medical Center
Chicago, IL

E-mail: adan_becerra@rush.edu

Amir H. Dorafshar, MD

Rush University Medical Center
Chicago, IL

E-mail: amir_dorafshar@rush.edu

REFERENCES

- Rosengart TK, Mason MC, LeMaire SA, et al. The seven attributes of the academic surgeon: critical aspects of the archetype and contributions to the surgical community. *Am J Surg*. 2017;214:165–179.
- Shah A, Pietrobon R, Cook C, et al. Little science, big science: strategies for research portfolio selection in academic surgery departments. *Ann Surg*. 2007;246:1110–1115.
- Petersen AM, Wang F, Stanley HE. Methods for measuring the citations and productivity of scientists across time and discipline. *Phys Rev E Stat Nonlin Soft Matter Phys*. 2010;81(3 Pt 2):036114.
- Borgman CL, Furner J. Scholarly communication and bibliometrics. *Annu Rev Inf Sci Technol*. 2002;36:2–72.
- Wu L, Wang D, Evans JA. Large teams develop and small teams disrupt science and technology. *Nature*. 2019;566:378–382.
- Funk RJ, Owen-Smith J. A dynamic network measure of technological change. *Manage Sci*. 2017;63:791–817.
- Loonen MPJ, Hage JJ, Kon M. Plastic surgery classics: characteristics of 50 top-cited articles in four plastic surgery journals since 1946. *Plast Reconstr Surg*. 2008;121:320e–327e.
- Boyd CJ, Patel JJ, Soto E, et al. Differences in highly-cited and lowly-cited manuscripts in plastic surgery. *J Surg Res*. 2020;255:641–646.
- Shiah E, Heiman AJ, Ricci JA. Analysis of alternative metrics of research impact: a correlation comparison between altmetric attention scores and traditional bibliometrics among plastic surgery research. *Plast Reconstr Surg*. 2020;146:664e–670e.
- Ruan QZ, Chen AD, Cohen JB, et al. Alternative metrics of scholarly output: the relationship among altmetric score, Mendeley reader score, citations, and downloads in plastic and reconstructive surgery. *Plast Reconstr Surg*. 2018;141:801–809.
- Becerra AZ, Aquina CT, Hayden DM, et al. The top 100 most disruptive publications in academic surgery journals: 1954–2014. *Am J Surg*. 2020:S0002-9610(20)30501-8. (E-pub ahead of print).
- Khusid JA, Gupta M, Sadiq AS, et al. Changing the status quo: the 100 most disruptive papers in urology? *Urology*. 2021 Jan 4:S0090-4295(20)31528-4. (E-pub ahead of print).
- Hutchins BI, Santangelo G; iCite. iCite Database Snapshots (NIH Open Citation Collection) [Internet]. figshare; 2019. . <https://icite.od.nih.gov/>. Accessed March 1, 2020.
- Wickham H. *ggplot2: Elegant Graphics for Data Analysis*. New York: Springer-Verlag; 2016. <https://ggplot2.tidyverse.org>. Accessed March 1, 2020.
- Rohrich RJ. Minimally invasive, limited incision breast surgery: passing fad or emerging trend? *Plast Reconstr Surg*. 2002;110:1315–1317.
- Snyderman RK, Ego-Acquiere E, Starzynski TE. The ultimate fate of freeze dried fascia: experience with its use in the correction of facial paralysis. *Plast Reconstr Surg*. 1966;38:219–222.
- Kesselring UK, Meyer R. A suction curette for removal of excessive local deposits of subcutaneous fat. *Plast Reconstr Surg*. 1978;62:305–306.
- Sterodimas A, Boriani F, Magarakis E, et al. Thirtyfour years of liposuction: past, present and future. *Eur Rev Med Pharmacol Sci*. 2012;16:393–406.

19. Schneider AM, Morykwas MJ, Argenta LC. A new and reliable method of securing skin grafts to the difficult recipient bed. *Plast Reconstr Surg*. 1998;102:1195–1198.
20. Illouz YG. Body contouring by lipolysis: a 5-year experience with over 3000 cases. *Plast Reconstr Surg*. 1983;72:591–597.
21. Bruner JM. The zig-zag volar-digital incision for flexor-tendon surgery. *Plast Reconstr Surg*. 1967;40:571–574.
22. Abyholm FE, Borchgrevink HH, Eskeland G. Palatal fistulae following cleft palate surgery. *Scand J Plast Reconstr Surg*. 1979;13:295–300.
23. Sheen JH. Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty. *Plast Reconstr Surg*. 1984;73:230–239.
24. McKissock PK. Reduction mammoplasty with a vertical dermal flap. *Plast Reconstr Surg*. 1972;49:245–252.
25. Snell JA, Dott WA. Internal fixation of certain fractures of the mandible by bone plating. *Plast Reconstr Surg*. 1969;43:281–286.
26. Koshima I, Soeda S. Inferior epigastric artery skin flaps without rectus abdominis muscle. *Br J Plast Surg*. 1989;42:645–648.
27. Battle R. Plastic surgery in the two world wars and in the years between. *J R Soc Med*. 1978;71:844–848.
28. Riskin DJ, Longaker MT, Gertner M, et al. Innovation in surgery: a historical perspective. *Ann Surg*. 2006;244:686–693.
29. Borgman CL, Furner J. Scholarly communication and bibliometrics. *Annu Rev Inform Sci Technol*. 2002;36:3–72.
30. Gast KM, Kuzon WM Jr, Waljee JF. Bibliometric indices and academic promotion within plastic surgery. *Plast Reconstr Surg*. 2014;134:838e–844e.