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Review Article

The 100 Classic Papers in Spinal Deformity Surgery

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Abstract

Study Design: Bibliometric review of the literature.
Objective: To identify and analyze the top 100 cited articles in spinal deformity surgery.
Summary of Background Data: The field of spinal deformity surgery is an ever-growing and complex field that owes its development to the work and visions of many dedicated individuals.
Methods: The authors searched the Thomson Reuters Web of Knowledge for citations of all articles relevant to scoliosis and spinal deformity surgery. The number of citations, authorship, year, journal, and country and institution of publication were recorded for each article.
Results: The most cited article was the 2001 work by Lenke et al. describing a new 2-dimensional classification system of adolescent idiopathic scoliosis used to determine the appropriate vertebral levels to be included in an arthrodesis. The second most cited was Harrington's 1962 article describing the first instrumented method for the treatment of scoliosis. The third most cited article was the 1983 study by King et al. recommending specific vertebral levels for inclusion into spinal arthrodesis. Most articles originated in the United States (62), and most were published in *Spine* (32). Most were published in the 1990s (28), and the 3 most common topics, in descending order, were adolescent idiopathic scoliosis (28), spinal instrumentation (18), and surgical complications (5). Author Suk had 5 articles in the top 100 list, whereas authors Kim, Liljenqvist, Lonstein, and Weinstein had 3 each. Washington University in St. Louis had 7 articles in the top 100 list.
Conclusions: This report's identification of the 100 classic articles in spinal deformity surgery allows insight into the development and trends of this challenging subspecialty of spine surgery. Furthermore, this article identifies individuals who have contributed the most to the advancement of spinal deformity surgery and the body of knowledge used to guide evidence-based clinical decision making in spinal deformity surgery today.

Keywords: Top 100 articles; Scoliosis; Adolescent idiopathic scoliosis; Spinal deformity

Introduction

The subspecialty of spinal deformity surgery is an ever evolving, dynamic specialty that owes its advancements to many individuals and their pioneering works that have shaped the way we practice spinal deformity surgery today. One way to distinguish and honor these individuals is through recognizing the importance of their scientific publications. This is the first study to analyze and quantify the most highly cited articles in spinal deformity surgery and to measure their relevant impact on the entire spinal deformity literature.

A citation is an alphanumeric expression that acknowledges the relevance given by the author to the work of others on a topic of discussion in which the citation appears [1]. The primary goal of a citation is to credit authors on the work they previously published. The greater the number of citations an author has, the more esteemed that author becomes in the field of practice. Citation analysis is used to determine the relative importance of medical journals by means of the impact factor, which is determined from the

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Table 1
Top 100 articles in spinal deformity, by first author.

Rank	First Author	Citations	Rank	First Author	Citations	Rank	First Author	Citations
1	Lenke, LG [11]	490	35	Risser, JC [45]	170	69	Boos, N [79]	125
2	Harrington, PR [12]	473	36	Belmont, PJ [46]	167	70	Vedantam, R [80]	124
3	King, HA [13]	444	37	Lonstein, JE [47]	164	71	Asher, R [81]	122
4	Lonstein, JE [14]	360	38	Lenke, LG [48]	160	72	Youkilis, AS [82]	122
5	Bernhardt, M [15]	316	39	Rowe, DE [49]	159	73	Stokes, IAF [83]	121
6	Suk, SI [16]	299	40	Aebi, M [50]	157	74	Mehta, MH [84]	120
7	Nuwer, MR [17]	274	41	Brooks, HL [51]	152	75	Newton, PO [85]	120
8	Kim, YJ [18]	272	42	Lowe, TG [52]	150	76	Emami, A [86]	120
9	Bergofsky, EH [19]	271	43	Dubousset, J [53]	147	77	Suk, SI [87]	120
10	Nachemson, AL [20]	270	44	Kim, YJ [54]	146	78	James, JI [88]	119
11	Wynne-Davies, R [21]	260	45	Ponseti, IV [55]	145	79	Dwyer, AF [89]	119
12	Legaye, J [22]	259	46	Wilber, RG [56]	145	80	Fon, GT [90]	119
13	Nash, CL [23]	251	47	Emans, JB [57]	144	81	Lagrone, MO [91]	118
14	Warren, MP [24]	242	48	Winter, RB [58]	142	82	Ransford, AO [92]	118
15	Macewen, GD [25]	234	49	Engler, GL [59]	142	83	Nilsonne, U [93]	117
16	Boyd, SG [26]	233	50	Dommisse, GF [60]	141	84	Allen, BL [94]	117
17	Suk, SI [27]	231	51	Bunnell, WP [61]	141	85	Hamill, CL [95]	117
18	Glassman, SD [28]	229	52	Asher, M [62]	141	86	Schwab, FJ [96]	117
19	Cochran, T [29]	226	53	Suk, SI [63]	140	87	Aaro, S [97]	115
20	Ponseti, IV [30]	222	54	Campbell, RM [64]	140	88	Richards, BS [98]	115
21	Schlegel, JD [31]	221	55	Nachemson, AL [65]	138	89	Machida, M [99]	114
22	Liljenqvist,UR [32]	216	56	Luque, ER [66]	138	90	Merloz, P [100]	114
23	Morrissy, RT [33]	210	57	Roussouly, P [67]	138	91	Akbarnia, BA [101]	114
24	Rogala, EJ [34]	206	58	Shands, AR [68]	136	92	Sahlstrand, T [102]	113
25	Carman, DL [35]	204	59	Ellis, ER [69]	134	93	Lonstein, JE [103]	113
26	Haher, TR [36]	197	60	Passuti, N [70]	134	94	Weinstein, SL [104]	113
27	Weinstein, SL [37]	185	61	Bunnell, WP [71]	133	95	Carr, WA [105]	112
28	Betz, RR [38]	185	62	Riseborough, EJ [72]	132	96	Leatherman, KD [106]	111
29	Stokes, IAF [39]	184	63	Lee, SM [73]	132	97	Thompson, JP [107]	109
30	Weinstein, SL [40]	178	64	Roaf, R [74]	129	98	Liljenqvist, UR [108]	109
31	McMaster, MJ [41]	177	65	Suk, SI [75]	128	99	Kosmopoulos, V [109]	109
32	Kim, YJ [42]	177	66	Myers, MA [76]	127	100	Machida, M [110]	108
33	Collis, DK [43]	175	67	McDonnell, MF [77]	126			
34	Dickson, RA [44]	171	68	Liljenqvist, UR [78]	126			

ratio of the number of citations in the current year to articles published in the journal in the 2 preceding years, divided by the number of citable items published in the same 2 years [2-4]. The impact factor has emerged as the marker of the quality and rank of a journal.

Recent publications identified the top 100 articles in orthopedic surgery [1] and pediatric orthopedic surgery [5]. Multiple other studies exist examining publication history in the fields of otolaryngology [6], dermatology [7], critical care [8], plastic surgery [9], and general surgery [10].

The goal of this study was to identify the top 100 articles relevant to spinal deformity surgery and published in surgical and non–surgery-related journals through an extensive search of the literature using methods validated in other similar, previously published studies.

Materials and Methods

The current authors used the Thomson Reuters Web of Knowledge, a research platform that provides bibliographic database services, to search for citations of all articles from 1900 to 2013 relevant to scoliosis and spinal deformity surgery and published in surgical and nonsurgical journals. The decision about which journals to search was made with the use of the Thomson Reuters Journal Citation Report database, which ranks journals according to impact factor.

The researchers used search limits and sorting options in the Thomson Reuters Web of Knowledge to rank all articles from each journal according to the number of citations. The results were then carefully reviewed and only those relevant to scoliosis and spinal deformity surgery were selected. The 100 articles that matched the search criteria were then further analyzed, and the title, first author, journal and year of publication, number of citations, and country and institution of origin were recorded.

Results

A total of 38,193 articles matched the search criteria. Of those, 584 were cited ⩾ 100 times. Table 1 lists the top 100 articles, their first author, and their corresponding number of citations. The top article was cited 490 times, the 100th article was cited 108 times, and the mean number of citations for the top 100 articles was 171.1. The articles were published between 1950 and 2007. The oldest article was by Ponseti and Friedman [55], published in 1950. The