Jentashapir J Health Res. 2019 April; 10(2):e90859. doi: 10.5812/jjhr.90859.

Published online 2019 July 22. **Review Article**

Bibliometric Analysis of Hydatid Cyst and Hydatid Cyst Surgery Literature Between 1975 and 2017

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Received 2019 February 19; **Accepted** 2019 June 23.

Abstract

Context: Hydatid disease is a zoonotic infection caused by several species of Echinococcus. Although medical literature had numerous articles related to hydatid disease and hydatid cyst surgery, no bibliometric analysis has been reported.
Evidence Acquisition: We aimed to perform a detailed bibliometric evaluation of hydatid disease and hydatid cyst surgery literature in our study. We extracted our data from four databases titled Web of Science Core Collection, Korean Journal Database, Russian Science Citation Index, and SciELO Citation Index. All documents published between 1975 and 2017 were included.
Results: A total of 6928 articles were found related to hydatid disease. Turkey was found to be the most productive country with 1459 items (21%) followed by India, the UK, Spain, and the USA (561, 493, 392, and 391 papers, respectively). Tunis El Manar University in Tunisia was found to be the most productive institution with 122 papers. A total of 3410 documents were detected as we performed a search in the literature of hydatid cyst surgery. Turkey produced 26.16% of all literature with 892 items followed by India, France, and Spain (248, 219, and 187 articles, respectively). World Journal of Surgery ranked first with the publication number in this field with 66 articles.
Conclusions: Researches from the regions and countries having a high prevalence of hydatid disease should be encouraged and funded to carry out novel studies. Physicians from the countries with a high publication number in this field should produce more citable articles.

Keywords: Hydatid Disease, Hydatid Cyst, Surgery, Bibliometrics, Scientometrics, Analysis

1. Context

Echinococcus infections are the most common parasitic disease affecting the liver. Hydatid disease course is typically slow, and patients may remain asymptomatic for many years. Diagnosis of the hydatid cyst is usually incidental (1). Although the prevalence of the hydatid disease has fallen in several decades, recent data suggest that *Echinococcus multilocularis* is expanding its geographical range in the northern hemisphere and the infection with *Echinococcus granulosus* remains a major health problem in certain regions and countries in the world (2, 3). Since the medical literature lacks a bibliometric study evaluating the articles published in hydatid disease and hydatid cyst surgery, in this study, we aimed to assess the documents published in this field.

2. Evidence Acquisition

The databases we used for the evaluation of the literature in our study was provided by Thomson Reuters WoS (Thomson Reuters, New York, NY, USA), titled Web of Science Core Collection, Korean Journal Database, Russian Science Citation Index, and SciELO Citation Index. We used the keyword "hydatid cyst" to search the WoS database. Information from 1975 was provided from the WoS database. We included all documents published between 1975 to 2017 in the study. We excluded all papers produced in 2018. Documents published from England, Northern Ireland, Scotland, and Wales were included under the United Kingdom (UK) heading. Statistical analyses were performed by using SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA; licensed for Hitit University, Corum, Turkey). We created infographics showing scientometric networks by using the VOSviewer software tool for constructing and visualizing bibliometric networks (4). We generated info maps revealing pub-

lication density of the countries throughout the world by using GunnMap free resource (5).

3. Results

3.1. Hydatid Cyst Literature

Our database search retrieved a total of 6928 documents. The keywords "hydatid cyst" and "hydatid disease" were used in the medical literature between 1975 and 2017. It was found that 89.6% of total papers were original articles (n = 6206) followed by case reports (n = 2430, 35%) (Table 1). The number of open-access documents was 1210 (17.46%). English is the primary language of the documents (n = 6172, 89.1%) followed by French (11.1%), Spanish (4.3%), German (2.7%), Russian (1.5%), and Turkish (1.1%). The top 100 countries producing HC documents were ranked by NP, and infographic showing the world of HC literature was generated (Figure 1). Turkey was found to be the most productive country on HC literature with 1459 items (21%) followed by India, the UK, Spain, and the USA (561, 493, 392, and 391 papers, respectively) (Figure 1). The distribution of density of published HC documents was shown on a generated infographic world map (Figure 2).

Table 1. Document Types in Health Literature Related to Hydatid Cyst and Surgery of Hydatid Cyst Published Between 1975 and 2017

Field[a]/Document Types	Hydatid Cyst, No. (%)	Hydatid Cyst Surgery, No. (%)	Total, No. (%)
Original Article	6206 (89.58)	3194 (93.67)	9400 (90.93)
Review	527 (7.61)	307 (9)	834 (8.07)
Editorial	341 (4.92)	145 (4.25)	486 (4.7)
Meeting	279 (4.03)	107 (3.14)	386 (3.73)
Letter	499 (7.2)	213 (6.25)	712 (6.89)
Case Report	2430 (35.07)	1588 (46.57)	4018 (38.87)
Abstract	637 (9.19)	355 (10.41)	992 (9.59)
Correction	10 (0.14)	1 (0.03)	11 (0.11)
Clinical Trial	69 (1)	40 (1.17)	109 (1.05)
Biography	2 (0.03)	1 (0.03)	3 (0.03)
Unspecified/Others	1194 (17.23)	385 (11.29)	1579 (15.27)
Book	3 (0.04)	1 (0.03)	4 (0.04)
Total[b]	6928 (100)	3410 (100)	10338 (90.93)

[a] Sorted by total number of publications.
[b] Total percentages may exceed 100% because certain items were included in more than one category.

Tunis El Manar University in Tunisia was found to be the most productive institution with 122 papers (1.76%) followed by Assistance Publique - Hopitaux de Paris, Istanbul

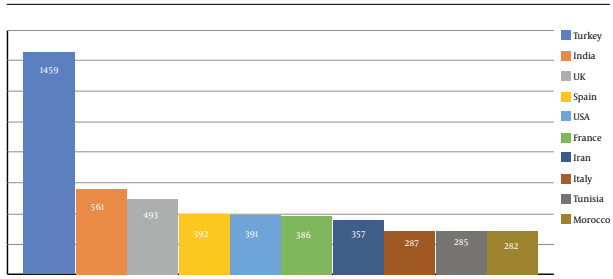

Figure 1. Top 10 countries producing hydatid disease publications by number of documents

University, and Hacettepe University (118, 105, and 95 documents, respectively) (Table 2). American Journal of Tropical Medicine and Hygiene had the highest publication number in this field with 161 items (Table 3). The top three authors producing HC articles were Craig PS, Wen H, and Brunetti E (n = 126, 56, and 42 papers, respectively). Cumulative citation number of all HC literature was 76178, and average citations per year were calculated as 1953.28. The most cited article was an original article titled "Ultrasound Examination of The Hydatic Liver" by Gharbi et al., published in 1981 and cited 554 times (Table 4) (6).

We extracted the most used keywords from the database including the most cited articles and found that "Hydatid cyst", "Echinococcus granulosus", "echinococcosis", "hydatid disease", and "liver" were the top five keywords (used 130, 57, 54, 29, and 25 times) (Table 5).

3.2. Surgery of Hydatid Cyst Literature

A total of 3410 documents were detected as we performed a search in the WoS database by using keywords "hydatid cyst" and "surgery". The top 10 countries produced documents in this field was ranked by the number of publications (Figure 3). Turkey produced 26.16% of all literature with 892 items followed by India, France, and Spain (248, 219, and 187 articles, respectively) (Figure 4). We created an info map, including all countries publishing in this field (Figure 5). We found that a high majority of the documents were original articles (n=3194, 93.67%) (Table 1). English was a major language of the literature (88.36%) followed by French, Spanish, and German (13.9, 4.19, and 2.93%, respectively).

Atatürk University (Malatya, Turkey) was found to be the most productive institution with 85 items followed by Assistance Publique- Hopitaux de Paris (Paris, France), Istanbul University (Istanbul, Turkey), Ankara University (Ankara, Turkey), Tunis El Manar University (Tunis, Tunisia), Hacettepe University (Ankara, Turkey), and Ankara Numune Training and Research Hospital (Ankara, Turkey),

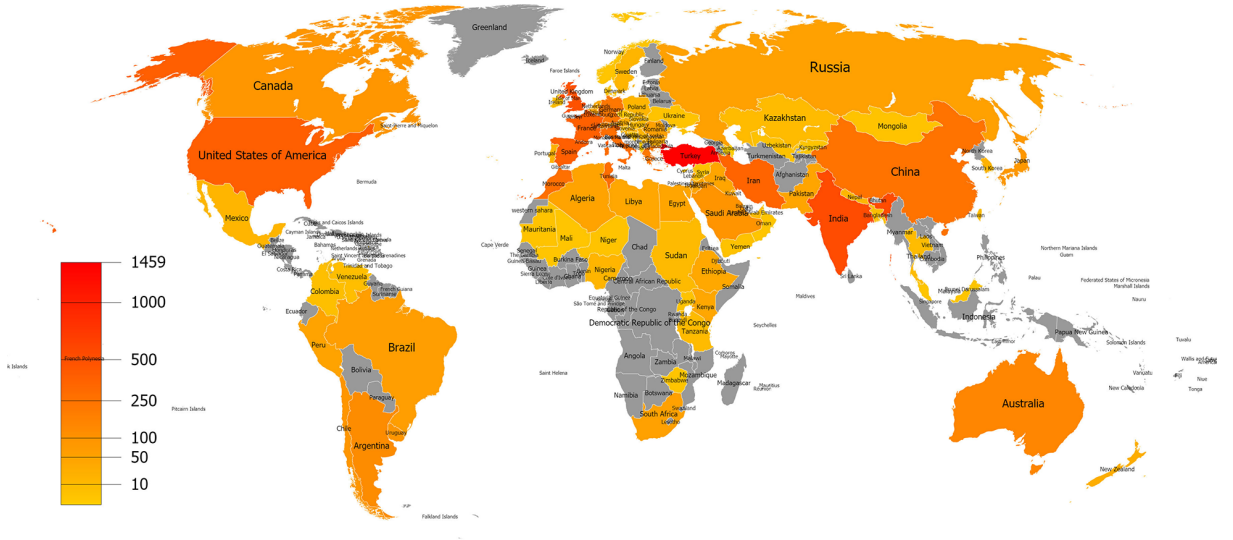

Figure 2. Publication density distribution of the world countries

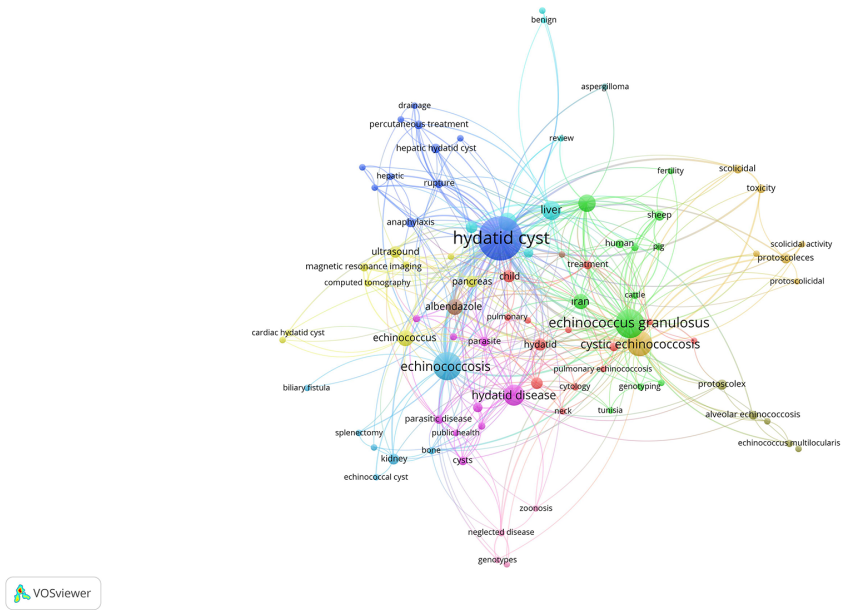

Figure 3. The network of the most used keywords in hydatid disease literature

and (76, 75, 74, 71, 52, and 50 documents, respectively).

The World Journal of Surgery ranked first with the publication number in this field with 66 articles followed by Annales De Chirurgie, Hepato-Gastroenterology, and Khirurgiia (63, 43, and 41 items, respectively). We noted that 3410 articles in this field were cited a total of 39871 times. The most cited article was titled "Ultrasound Examination of The Hydatic Liver" by Gharbi, HA et al., cited 554 times (Table 6). The most used keywords in this field were hydatid cyst, echinococcosis, surgery, and hydatid disease

Table 2. The Most Productive 20 Institutions in Health Literature Related to Hydatid Cyst and Hydatid Cyst Surgery Published Between 1975 and 2017

Institutions	No. (%)
Hydatid Cyst	
Tunis El Manar University, Tunis, Tunisia	122 (1.76)
Assistance Publique- Hôpitaux de Paris, Paris, France	118 (1.7)
Istanbul University, Istanbul, Turkey	105 (1.52)
Hacettepe University, Ankara, Turkey	95 (1.37)
Ankara University, Ankara, Turkey	75 (1.08)
University of the Republic Uruguay, Montevideo, Uruguay	75 (1.08)
Selçuk University, Konya, Turkey	72 (1.04)
Tehran University of Medical Sciences, Tehran, Iran	71 (1.02)
University of Athens, Athens, Greece	71 (1.02)
Ankara Numune Training and Research Hospital, Ankara, Turkey	68 (0.98)
Xinjiang Medical University, Ürümqi, China	67 (0.97)
Gülhane Training and Research Hospital, Ankara, Turkey	67 (0.97)
Ege University, Izmir, Turkey	58 (0.83)
University of Salford, Salford, England, UK	56 (0.81)
Sapienza University of Rome, Rome, Italy	54 (0.78)
Dicle University, Diyarbakır, Turkey	53 (0.76)
Postgraduate Institute of Medical Education and Research, Chandigarh, India	52 (0.75)
Inonü University, Malatya, Turkey	49 (0.71)
Atatürk University, Malatya, Turkey	48 (0.69)
Hospital Rabta, Tunis, Tunisia	48 (0.69)
Hydatid Cyst Surgery	
Atatürk University, Malatya, Turkey	85 (2.492)
Assistance Publique- Hôpitaux de Paris, Paris, France	76 (2.229)
Istanbul University, Istanbul, Turkey	75 (2.199)
Ankara University, Ankara, Turkey	74 (2.17)
Tunis El Manar University, Tunis, Tunisia,	71 (2.082)
Hacettepe University, Ankara, Turkey	52 (1.525)
Ankara Numune Training and Research Hospital, Ankara, Turkey	50 (1.466)
University of Athens, Athens, Greece	48 (1.408)
Selçuk University, Konya, Turkey	39 (2.492)
Xinjiang Medical University, Ürümqi, China	35 (1.026)
Tehran University of Medical Sciences, Tehran, Iran	34 (0.997)
Dicle University, Diyarbakır, Turkey	33 (0.968)
Gülhane Training and Research Hospital, Ankara, Turkey	33 (0.968)
Istanbul University, Istanbul, Turkey	31 (0.909)
Erciyes University, Kayseri, Turkey	30 (0.880)
Chu Ibnou Rochd, Casablanca, Morocco	29 (0.850)
Ankara Turkiye Yuksek Ihtisas Egitim Ve Arastirma Hastanesi, Ankara, Turkey	28 (0.821)
Inonü University, Malatya, Turkey	28 (0.821)
All India Institute of Medical Sciences, New Delhi, India	27 (0.792)
Ege University, Izmir, Turkey	27 (0.792)

(used 150, 64, 58, and 49). We generated a keyword network by using the top keywords (Figure 6).

Table 3. The Most Productive 10 Journals in Health Literature Related to Hydatid Cyst and Hydatid Cyst Surgery Published Between 1975 and 2017

Institutions	No. (%)
Hydatid Cyst	
American Journal of Tropical Medicine and Hygiene	161 (2.32)
American Journal of Roentgenology	124 (1.79)
Parasitology Research	96 (1.38)
Annals of Tropical Medicine and Parasitology	95 (1.37)
Veterinary Parasitology	91 (1.31)
Acta Tropica	77 (1.11)
World Journal of Surgery	73 (1.05)
Annales De Chirurgie	72 (1.04)
Transactions of the Royal Society of Tropical Medicine and Hygiene	59 (0.85)
International Journal for Parasitology	58 (0.84)
Hydatid Cyst Surgery	
World Journal of Surgery	66 (1.93)
Annales de Chirurgie	63 (1.84)
Hepato Gastroenterology	43 (1.26)
Khirurgiia	41 (1.2)
American Journal of Tropical Medicine and Hygiene	39 (1.14)
Acta Chirurgica Belgica	37 (1.08)
The American Journal of Tropical Medicine and Hygiene	37 (1.08)
Journal de Chirurgie	36 (1.06)
Journal of Pediatric Surgery	34 (1)
Annals of Thoracic Surgery	33 (0.97)

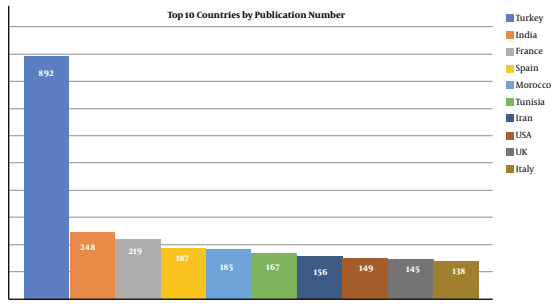

Figure 4. The most productive countries publishing in the literature of hydatid cyst surgery

4. Discussion

The greatest prevalences of hydatid disease in humans has been noted in temperate zones of the world such as Mediterranean countries, southern and central parts of Russia, central Asia, China, South America, and Australia

Table 4. The 10 Most Cited Manuscripts in Hydatid Cyst Literature

Article	Author	Publication Year	Total Citation	Average Citations per Year
Ultrasound examination of the hydatic liver	Gharbi et al.	1981	554	14.58
Echinococcosis	McManus et al.	2003	515	32.19
Expert consensus for the diagnosis and treatment of cystic and alveolar echinococcosis in humans	Brunetti et al.	2010	404	44.89
Hydatid disease: Radiologic and pathologic features and complications	Pedrosa et al.	2000	355	18.68
Cestodes-echinococcus	Ammann and Eckert	1996	298	12.96
Personal-experience with 411 hepatic resections	Iwatsuki and Starzl	1988	290	9.35
International classification of ultrasound images in cystic echinococcosis for application in clinical and field epidemiological settings	Macpherson et al.	2003	255	15.94
Cystic focal liver lesions in the adult: differential CT and MR imaging features	Mortele and Ros	2001	223	12.39
Percutaneous drainage compared with surgery for hepatic hydatid cysts	Khuroo et al.	1997	219	9.95
Albendazole-objective evidence of response in human hydatid-disease	Morris et al.	1985	210	6.18

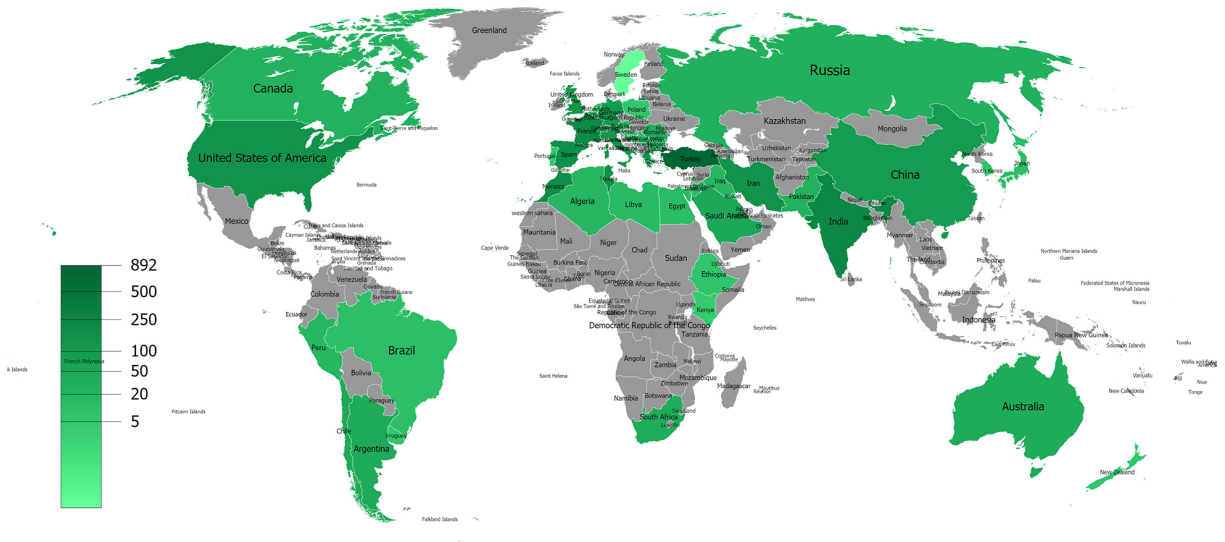

Figure 5. World countries according to the productivity density in hydatid cyst surgery area

(3). Hydatid cyst is an increasing health concern in many regions of the world and it is currently considered as an endemic zoonosis in the Mediterranean region (7, 8). The most endemic areas have been reported to be Mediterranean countries, and we found that six of the top ten countries publishing in hydatid disease literature were from the Mediterranean region (Figure 1). According to the WHO database, the annual incidence of hydatid disease is 4.4 in a 100000 population in Turkey, which was found in our study to be the most productive county of the world in this field. Although certain regions of Spain, Italy, and Cyprus had greater prevalences of hydatid disease than Turkey, the sum of publication numbers of these countries could not reach the document number of Turkey (6.2, 8, and 5.7, respectively). Although Turkey ranked first in the publication number, no article from Turkey was in the top 10 cited documents. The most cited articles in this field were from Tunisia and were published by Gharbi et al. As we evaluated the most cited items of the literature, we detected that the countries that produced these arti-

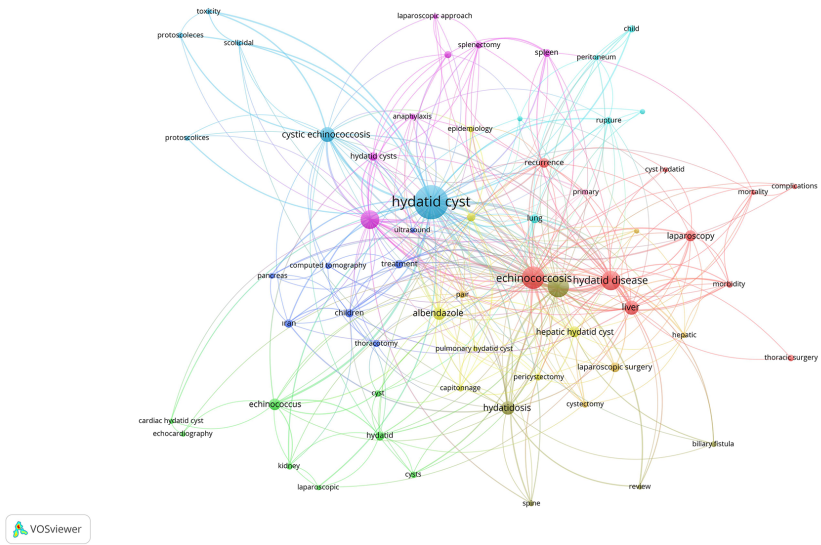

Figure 6. The most used keywords network in the literature related to hydatid cyst surgery

Table 5. Most Used 10 Keywords on the Literature Related to Hydatid Cyst and Hydatid Cyst Surgery Literature

Keywords	N, Times
Hydatid Cyst	
Hydatid cyst	130
Echinoccocus granulosus	57
Echinoccocosis	54
Hydatid disease	29
Liver	25
Surgery	23
Hydatidosis	21
Albendazole	18
Echinococcus	17
Iran	16
Hydatid Cyst Surgery	
Hydatid cyst	150
Echinoccocosis	64
Surgery	58
Hydatid disease	49
Echinoccocus granulosus	44
Cystic echinoccocosis	29
Liver	26
Hydatidosis	23
Albendazole	21
Echinococcus	18

cles were Tunisia, Australia, Italy, France, Germany, Spain, Switzerland, the USA, and India.

4.1. Limitation

Our study had two limitations. First, we used only one database, WoS, since it has been considered as the most reliable database in the academic literature. Second, we could not reach the documents before 1975 because WoS provided access to items published since 1975.

5. Conclusions

To the best of our knowledge, our study is the first bibliometric study in the literature related to hydatid disease and hydatid cyst surgery. Researches from the regions and countries having a high prevalence of hydatid disease should be encouraged and funded to carry out novel studies. Physicians from the countries with a high publication number in this field should produce more citable articles.

Footnotes

Authors' Contribution: Ümran Muslu: 70%; Engin Şenel: 30%.

Conflict of Interests: No conflict of interest or disclosures declared.

Ethical Considerations: All procedures performed in studies involving human participants were in accordance

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Personal-experience with 411 hepatic resections	Iwatsuki and Starzl	1988	290	9.35
Percutaneous drainage compared with surgery for hepatic hydatid cysts	Khuroo et al.	1997	219	9.95
Albendazole-objective evidence of response in human hydatid-disease	Morris et al.	1985	210	6.18
Diagnosis and management of hydatid-disease of the liver-a 15-year north-american experience	Langer et al.	1984	186	5.31
Laparoscopic liver resection of benign liver tumors-results of a multicenter european experience	Descottes et al.	2003	180	11.25
Surgical-treatment of hydatid cysts of the lung-report on 1055 patients	Dogan et al.	1989	180	6
Albendazole as a potential treatment for human hydatidosis	Saimot et al.	1983	180	5

with the ethical standards of the institutional and/or national Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Funding/Support: The study had no funding source.

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