The combination of an aging population and increasing use of antiplatelet and anticoagulant medications means that the incidence of chronic subdural hematoma (CSDH) is expected to increase substantially in the next 25 years.5

There is consensus that surgical evacuation should be offered to patients who have symptoms attributable to a CSDH. The 3 main methods for evacuation include bur hole craniostomy (BHC), twist-drill craniostomy (TDC), and craniotomy.5,15,19 Overall, BHC seems to be the most widely practiced technique, as it balances a lower recurrence rate (in comparison with TDC) with a lower morbidity rate (in comparison with craniotomy).5,15,16,19 Nevertheless, continuing refinement and evaluation of existing surgical techniques is essential for improving the care and outcomes of patients with CSDH.

More recently, a novel technique involving a hollow screw, which is threaded through a twist-drill hole in the cranium and then connected to a closed drainage system, has been increasing in popularity. This technique can be undertaken without general anesthesia at the bedside.18 The hollow screw technique can be viewed as a modification of the originally described TDC technique;18 both techniques rely on the use of a twist drill, but the hollow screw method does not require the insertion of a catheter into the subdural space.

There are currently 2 available products on the market: the Subdural Evacuating Port System (SEPS, initially manufactured by Medical Designs LLC and later by Medtronic Inc.) and the hollow screw (initially manufac-

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**Object.** The incidence of chronic subdural hematoma (CSDH) is expected to increase substantially over the next 25 years. Continuing refinement of techniques for surgical evacuation is essential for optimizing patient outcomes. A novel technique involving a hollow screw, which is threaded through a twist-drill hole in the cranium and then connected to a closed drainage system, has been increasing in popularity. The aim of this systematic review is to collate and analyze the published experience with this novel technique and to evaluate its efficacy in comparison with the other surgical treatment methods.

**Methods.** This systematic review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and has been registered with the PROSPERO International Prospective Register of Systematic Reviews (registration number CRD42013003544). MEDLINE, Web of Knowledge, EMBASE, and the Cochrane Database of Systematic Reviews were searched for published series involving more than 10 patients treated with these new techniques.

**Results.** Nine eligible studies were found (6 case series and 3 case-control studies) comprising 796 patients treated with these new techniques. Pooled analysis showed a “success rate” of 77.6% (95% CI 74.6%–80.4%), recurrence rate of 22.4%, and in-hospital mortality of 1.4%.

**Conclusions.** This systematic review adds further evidence to the pool of data assessing the safety and efficacy of the use of this novel, minimally invasive technique for the treatment for CSDH. Overall, twist-drill craniostomy with hollow screws appears to be safe and effective. Class I evidence is necessary to optimize the surgical management of patients with CSDH.

(http://thejns.org/doi/abs/10.3171/2014.4.JNS131212)

**Key Words** • chronic subdural hematoma • minimally invasive • hollow screw • subdural evacuating port system • systematic review • surgical technique

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**Abbreviations used in this paper:** BHC = bur hole craniostomy; CSDH = chronic SDH; SDH = subdural hematoma; SEPS = Subdural Evacuating Port System; TDC = twist-drill craniostomy.
Minimally invasive techniques in CSDH

tered by Fehling Instruments and later by Teleflex Medical). The procedures are largely similar, but the hollow screw procedure uses intraoperative and postoperative (once daily) irrigation routinely to promote brain reexpansion. The SEPS does not use irrigation but relies on a low negative pressure applied through a suction reservoir bulb to promote drainage of the collection and gradual brain reexpansion. Both techniques are explained in detail in the original publications.1,6

The technique is advantageous in that the procedure can be undertaken at the bedside under local anesthesia and is therefore feasible in patients who are not suitable for general anesthesia. It has been argued that the closed drainage system under slight negative pressure allows satisfactory evacuation of the CSDH without the need to insert a subdural drain, thereby reducing the risks of brain laceration and bleeding from cortical vessels.1,6 It has also been suggested that this novel technique can shorten the length of stay, leading to cost savings.2

The aim of this systematic review is to collate the current experience with these novel hollow screw systems and evaluate their safety and efficacy in comparison with the other surgical treatment methods.

Methods

This systematic review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and MOOSE (Meta-analysis Of Observational Studies in Epidemiology) guidelines and has been registered with the PROSPERO International Prospective Register of Systematic Reviews (registration number CRD42013003544).

MEDLINE, Web of Knowledge, EMBASE, and the Cochrane Database of Systematic Reviews were all searched on December 31, 2012, according to the following criteria: (“subdural evacuating port system” OR “subdural evacuation port system” OR “evacuating port system” OR “SEPS” OR “evacuating port system” OR “port system” OR “hollow screw”) AND (“subdural” OR “subdural”) AND (“chronic” OR “subacute”).

Study titles and abstracts were then screened for suitability according to the following criteria. Patients: Any patient with a chronic or subacute SDH (defined radiologically as a predominantly isodense or hypodense collection on CT imaging). Intervention: Use of SEPS or hollow screw for primary surgical management of CSDH. Control: A control arm was not necessary. Control arm data were not collected due to the presence of large volume data from 2 existing meta-analyses. Outcomes: “Successful” outcome was heterogeneously defined in many of the papers and none had long-term functional outcomes. While collating data, we defined a successful outcome as “symptomatic improvement on the same admission with one or more hollow screw/SEPS devices.” Complications were documented, and radiological outcomes were also collected where presented. Study design: Consecutive case series (prospective and retrospective) with more than 10 patients, case-control studies, and prospective trials were all eligible for inclusion. Reporting: Only complete papers were eligible for inclusion. In cases in which only an abstract was available, effort was made to obtain a full paper or further data from the authors.

The papers that were found to be relevant were read to assess eligibility for inclusion, and their bibliographies were scrutinized for further studies that might be eligible. The search strategy is summarized in Fig. 1.

Data were extracted from eligible studies via a piloted proforma independently by 2 authors (A.C. and A.G.K.). Where there were disparities, both authors discussed and resolved the issues with reference to the original papers.

Statistical analysis was performed using Microsoft Excel (Microsoft Inc.) and R (http://www.r-project.org). To aggregate study data, an initial model was fitted of a binomial distribution with a random intercept at the individual study level on the logistic scale, and individual studies were weighted by the sample size. The maximum likelihood estimate of the variance of the random effects was zero. Therefore, a simplified model with a single fixed intercept was assessed to have produced the most accurate summary of the data. This can be interpreted and described most simply as a pooled weighted average of the individual study rates.

Results

Nine eligible studies were found (Table 1), including 6 case series and 3 case-control studies.1,2,6,8,12–14,17 No randomized trials were found. All eligible studies were retrospective. Seven used the SEPS and 2 studies used the hollow screw.

Each study was assessed for bias at the study level using the The Cochrane Collaboration’s risk of bias tool. High risk of performance, detection, attrition, and reporting bias were identified in all the studies.

A total of 796 patients were involved in the SEPS/hollow screw arms of these studies, with a mean age of 70.5 years (range 12–97 years); 60.3% of patients were male. Three hundred fifty-seven (44.8%) were on a regimen of anticoagulant or antiplatelet agents at presentation, and the presenting symptoms are summarized in Table 2.

Being retrospective, many of the studies had no explicit inclusion and exclusion criteria, stating that the choice of whether to use the SEPS/hollow screw was down to physician choice. However, most stated that chronic or subacute SDH (defined as hypodense or isodense collections on CT scans, respectively) were eligible and those with multiple loculations or a significant acute component were often excluded by treating physicians. End points included both clinical (symptomatic improvement, complications, recurrence, and death) and radiological (reduction in volume or maximal thickness of CSDH and change in degree of midline shift) outcomes. There was significant heterogeneity in the studies’ definitions of success. Four studies did not explicitly define outcomes in their methods sections, 3 defined success as patients not requiring more than a single SEPS procedure, 1 defined success as requiring up to 2 SEPS during the same admission, and the remaining study had a primary radiological outcome involving estimated volume change pre- and postprocedure. However, all studies presented data in the results section that allowed us to amalgamate and analyze the data ac-
According to a uniform definition of success: “symptomatic improvement on the same admission with one or more hollow screw/SEPS devices” (Table 1). Three studies presented outcomes in terms of the number of collections drained (patients with bilateral CSDH accounted for 2 collections), while the other 6 studies presented outcomes in terms of patients.

All studies followed similar procedural protocol: those that used the SEPS used the original methods purported by Asfora and Schwabe, and those that used the hollow screw used the original methods of Emonds and Hassler. Five studies reported performing all procedures by the bedside either in the emergency department or the neurosciences critical care unit, 2 studies reported that most of their procedures were done at the bedside (remaining in the operating room), and only 1 study reported that all procedures were performed in an operating room; the remaining study did not report procedure location. The 3 studies in which not all procedures were performed at the bedside were older studies published prior to 2010.

As explained above, we considered “symptomatic improvement on the same admission with one or more hollow screw/SEPS devices” as a successful outcome. Of the studies that presented the results in terms of collections, 177 of 227 collections (78.0%, range 74.1%–82.8%) were successfully treated and of those that presented data in terms of patients, 455 of 587 patients (77.5%, range 65.4%–87.5%) were successfully treated. Recurrence rates (requiring readmission and reoperation with any technique or reoperation with BHC/craniotomy during the same admission) were 22.0% (range 17.2%–22.2%) and 22.5% (range 12.5%–34.6%) for collections and patients, respectively. The results are summarized in Table 1.

Pooled analysis showed a success rate of 77.6% (95% CI 74.6%–80.4%). The forest plot is shown in Fig. 2. Based on the simple overall pooled rate, the Q-statistic was calculated to be 10.25 on 8 df (p = 0.25). This is equivalent to an I-squared statistic of 22%, which can be interpreted as low heterogeneity. The variability in rates between studies is consistent with pure chance variation around a common underlying success rate.

Figure 3 hints of a trend toward success rate being associated with the proportion of patients on anticoagulant or antiplatelet agents at presentation, sex, and proportion of patients with bilateral CSDH.

Total in-hospital mortality was 1.38% (11 deaths), although 3 studies did not report mortality figures explicitly, and this might therefore be an underestimate (Table 1). We were unable to calculate complication rates as all studies presented the number of complications occurring in total, which meant that some patients were accounted for multiple times and simple aggregation would result in a gross overestimate of the complication rate; the complications noted are broken down in Table 3.

Four studies reported radiological outcomes. Two considered outcomes based on the maximum CSDH width, while the other 2 studies considered volume estimates. Overall, radiological improvement was seen in 150 of 197 collections (76.1%), and these and other studies commented on the lack of correlation between radiological and clinical outcomes with many patients experiencing symptomatic improvement despite lack of radiological improvement.

The only study to examine the logistical and economic implications of the SEPS suggested that the procedure was cheaper ($48,446 vs $67,227 [US dollars]) with a shorter time to intervention (11.2 hours vs 40.3 hours) and shorter length of hospital stay (9.3 days vs 13.4 days) compared with BHC.

All studies concluded that the new techniques are
TABLE 1: Details and summary of findings from studies included in the systematic review

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Type of Study</th>
<th>Institution</th>
<th>Technique</th>
<th>No. of Patients</th>
<th>Definition of Successful Clinical Outcome</th>
<th>Results Presented by Patients or Collections?</th>
<th>Total No. of Patients or Collections</th>
<th>Successful Outcome (%)</th>
<th>Recurrences/Reops (%)</th>
<th>Inpatient Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balser et al., 2013</td>
<td>case-control</td>
<td>NYU School of Medicine</td>
<td>SEPS</td>
<td>29</td>
<td>not defined; data presented as patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>29</td>
<td>24 (82.80)</td>
<td>5 (17.20)</td>
<td>0</td>
</tr>
<tr>
<td>Krieg et al., 2012</td>
<td>case series</td>
<td>Technische Universität München, Germany</td>
<td>hollow screw</td>
<td>320</td>
<td>not defined; percentage of patients requiring 1 or 2 hollow screws during same admission presented independently</td>
<td>patients</td>
<td>320</td>
<td>254 (79.40)</td>
<td>66 (20.60)</td>
<td>5</td>
</tr>
<tr>
<td>Neal et al., 2013</td>
<td>case series</td>
<td>Wake Forest University School of Medicine</td>
<td>SEPS</td>
<td>159</td>
<td>patients not requiring more than 2 SEPS during the same admission</td>
<td>patients</td>
<td>171</td>
<td>133 (77.80)</td>
<td>38 (22.20)</td>
<td>not stated</td>
</tr>
<tr>
<td>Safain et al., 2013</td>
<td>case-control</td>
<td>Tufts Medical Center</td>
<td>SEPS</td>
<td>23</td>
<td>primary radiological outcomes defined; data presented as patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>23</td>
<td>20 (87.00)</td>
<td>3 (13.00)</td>
<td>1</td>
</tr>
<tr>
<td>Singla et al., 2013</td>
<td>case series</td>
<td>SUNY Upstate Medical University</td>
<td>SEPS</td>
<td>52</td>
<td>patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>52</td>
<td>34 (65.40)</td>
<td>18 (34.60)</td>
<td>1</td>
</tr>
<tr>
<td>Kenning et al., 2010</td>
<td>case series</td>
<td>Albany Medical Center</td>
<td>SEPS</td>
<td>74</td>
<td>patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>74</td>
<td>55 (74.30)</td>
<td>19 (25.70)</td>
<td>not stated</td>
</tr>
<tr>
<td>Rughani et al., 2010</td>
<td>case-control</td>
<td>University of Vermont</td>
<td>SEPS</td>
<td>21</td>
<td>patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>27</td>
<td>20 (74.10)</td>
<td>7 (25.90)</td>
<td>2</td>
</tr>
<tr>
<td>Asfora &amp; Schwebach, 2003</td>
<td>case series</td>
<td>University of South Dakota School of Medicine</td>
<td>SEPS</td>
<td>32</td>
<td>not defined; data presented as patients not requiring intervention beyond single SEPS during the same admission</td>
<td>patients</td>
<td>32</td>
<td>28 (87.50)</td>
<td>4 (12.50)</td>
<td>not stated</td>
</tr>
<tr>
<td>Emonds &amp; Hassler, 1999</td>
<td>case series</td>
<td>Klinikum Kalkweg, Germany</td>
<td>hollow screw</td>
<td>86</td>
<td>not defined; patients had up to 4 hollow screw procedures during the same admission</td>
<td>patients</td>
<td>86</td>
<td>64 (74.40)</td>
<td>22 (25.60)</td>
<td>2</td>
</tr>
</tbody>
</table>
safe and effective procedures and should be considered in the treatment of CSDH, while 2 studies concluded that they should be first-line techniques.9,12 The 3 case-control studies all concluded that while minimally invasive hollow screw techniques were an established alternative, superiority had not been proven and more evidence was needed to establish these techniques as superior to traditional ones.

**Discussion**

This systematic review collates the published experience with new hollow screw techniques and suggests that they may be a feasible alternative treatment for symptomatic CSDH, estimating an overall success rate of 77.6% (95% CI 74.6%–80.4%, Fig. 3). The results with SEPS/hollow screws are not inferior compared to previously published meta-analyses of techniques such as BHC, TDC, and craniotomy (Table 4).5,19 This conclusion reflects the findings of all 3 case-control studies included in this systematic review; each concluded that there was no statistically different difference between clinical or radiological outcomes between SEPS and conventional techniques. Nevertheless, this may be due to the limited sample size.

In terms of complications, TDC techniques have been associated with lower complication rates than other techniques (Table 4). The complication rate in this series could not be calculated (see Results for explanation). The majority of those reported were medical complications (respiratory or urinary tract infections). The majority of the complications (108 of 126) were reported by Krieg et al.9 Wound infections were rare, and the only cases of postoperative meningitis occurred in the series of Krieg et al. in which intraoperative and postoperative (once daily) irrigation were routinely undertaken. Interestingly, such intracranial infections were not noted in the study by Emonds and Hassler6 in which irrigation was also used.

One of the most important complications of CSDH is recurrence requiring reoperation. In the current review, recurrence with the hollow screw techniques was 22.4%, while BHC recurrence rates from contemporary reviews are lower at 11.7%–12.1%. Although this suggests that recurrence rate may be higher with the hollow screw technique, firm conclusions cannot be drawn in the absence of high-quality prospective comparative data. In addition, a potentially higher recurrence rate may be offset by a lower mortality rate (1.4% with hollow screws vs 2.7%–3.7% with BHC). However, the lower mortality may also be confounded by several factors; this underlines the need for high-quality prospective studies with predefined end points.

With respect to radiological outcomes, the 2 case-control studies that examined these outcomes found no between-group statistically significant differences in terms

* GCS = Glasgow Coma Scale.

**TABLE 2: Summary of presenting symptoms of patients undergoing SEPS/hollow screw treatment for CSDH**

<table>
<thead>
<tr>
<th>Presentation</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>headache</td>
<td>24.1</td>
</tr>
<tr>
<td>focal neurological deficit</td>
<td>22.7</td>
</tr>
<tr>
<td>confusion</td>
<td>15.9</td>
</tr>
<tr>
<td>altered mental state/reduced GCS score</td>
<td>14.9</td>
</tr>
<tr>
<td>ataxia/gait disturbance</td>
<td>9.2</td>
</tr>
<tr>
<td>dizziness/syncope</td>
<td>6.9</td>
</tr>
<tr>
<td>dysphasia</td>
<td>4.4</td>
</tr>
<tr>
<td>seizure</td>
<td>1.1</td>
</tr>
<tr>
<td>other</td>
<td>0.8</td>
</tr>
</tbody>
</table>

![Fig. 2. Forest plot showing success rates (and 95% CIs) for each individual study and for the pooled total sample. Overall success rate was estimated at 77.6% (95% CI 74.6%–80.4%).](image-url)
of pre- and postoperative CSDH thicknesses/volumes. Safain et al. found a mean volume reduction of 68.2% for SEPS and 76.2% for traditional techniques ($p = 0.25$)\(^{14}\) and Rughani et al. found a mean reduction in maximal CSDH thickness of 45.4% in the BHC group and 40.5% in the SEPS group ($p = 0.31$)\(^{13}\); both studies performed follow-up CT scanning 4–6 weeks after the initial procedure. Kenning et al.\(^{8}\) mentioned that in their study, 8 patients had increased CSDH thickness postoperatively, 4 of which were in the success group and 4 of which were in the failure group. The fact that there is often a lack of correlation between radiological and clinical outcomes is not surprising. In their seminal study of TDC with closed-system drainage, Tabaddor and Shulmon demonstrated that the subdural pressure dropped to zero after the initial 20% of the subdural collection was removed.\(^{18}\) This was usually enough to lead to marked clinical improvement. In their study of BHC, Markwalder and colleagues found that 78% of the patients had a persistent subdural collection on CT on the 10th day after surgery that did not interfere with recovery.\(^{10}\)

The study by Balser et al. was the only study to examine the logistical and economic implications and concluded that the new minimally invasive techniques have many benefits over BHC including shorter time to intervention, length of hospital stay, and overall cost of treatment.\(^{2}\)

These findings highlight the many benefits of SEPS/hollow screw over traditional techniques. First, the minimally invasive nature of these techniques means that they can be performed after administration of a local anesthetic at the bedside. This obviates the time and cost of an operating room as well as the risks of a general anestesia and may allow the treatment of patients deemed not suitable for a procedure requiring general anesthesia. The review suggests low in-hospital mortality associated with these techniques.

Despite many purported benefits, there is clearly a need for Class I evidence to guide clinical decision making for the surgical treatment of CSDH, but given the

\[
\begin{array}{|c|c|}
\hline
\text{Complication} & \text{No.} \\
\hline
\text{surgical} & \\
\text{extradural hematoma} & 2 \\
\text{acute SDH} & 5 \\
\text{intracranial infection} & 5 \\
\text{wound infection} & 2 \\
\text{seizures} & 32 \\
\hline
\text{medical} & \\
\text{other infections (UTI/LRTI)} & 70 \\
\text{stroke} & 5 \\
\text{pulmonary embolus} & 4 \\
\text{myocardial infarction} & 1 \\
\hline
\end{array}
\]

* LRTI = lower respiratory tract infection; UTI = urinary tract infection.
heterogeneity of CSDH in patient demographics, presentation, and radiological characteristics, it is evident that different patients may benefit from different first-line procedures. Specifically, the radiological characteristics will play an important role in choosing patients suitable for minimally invasive techniques as first-line treatments. In fact, patients with multiple localizations and a significant acute component to the SDH were excluded from most of the published SEPS cohorts. By contrast, about one-third of the cohort of Krieg et al. included patients whose preoperative CT showed septation.\textsuperscript{9} Subgroup analysis showed that patients with septations had smaller reductions in CSDH thickness and midline shift postoperatively (p < 0.05), a lower chance of success with initial hollow screw placement (p < 0.05), and increased likelihood of needing repeat intervention with bur holes and meningeal resection compared with patients without septations.\textsuperscript{9}

On the basis of the available evidence, we believe that these new techniques should be systematically assessed according to the IDEAL (Idea, Development, Exploration, Assessment, Long-term follow-up) framework for evaluating surgical innovation.\textsuperscript{4,7,11} The retrospective studies included in this review act as bases for a prospective development study and/or pilot randomized trial prior to a definitive multicenter randomized controlled trial directly comparing the clinical and cost-effectiveness of BHC (the current gold standard) with TDC with hollow screws. Such a trial will need to have patient-centered outcomes (postoperative pain/discomfort and quality of life), carefully selected inclusion/exclusion criteria, clinical end points (functional outcome at 6 months, reoperation rate, complications, and mortality) and will need to be well powered, all of which can be fine-tuned during the development stage. A detailed health-economic analysis will also be crucial.

**Limitations of Study**

This study has a number of limitations. First, all the studies included were retrospective, with the inherent biases caused by retrospective note review. The heterogeneity in terms of inclusion and exclusion criteria (mostly based on clinician preference), treatment algorithms, and definitions of successful clinical outcomes made amalgamation of data somewhat difficult. Length of follow-up was also heterogeneous and, importantly, long-term follow-up was lacking. Complication rates could not be calculated due to heterogeneous reporting. The paucity of control data (88 patients from 3 studies using a variety of techniques including BHC and craniotomy) meant that these data were not ideal and thus data from published meta-analyses were used for comparison. However, even these meta-analyses suffer from the same limitations as the current study.

**Conclusions**

This systematic review of 796 patients undergoing TDC with SEPS/hollow screw for evacuation of CSDH reports an overall success rate of 77.6% (95% CI 74.6%–80.4%). This paper adds further evidence to the pool of data assessing the safety and efficacy of the use of a novel, minimally invasive technique involving the use of hollow screws as treatment for CSDH. Class I evidence from prospective randomized controlled trials will be required if this new technique is to be established firmly as a first-line treatment for this increasingly common condition.

**Disclosure**

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Author contributions to the study and manuscript preparation include the following. Conception and design: Kolias, Chari, Hutchinson. Acquisition of data: Kolias, Chari. Analysis and interpretation of data: Chari, Kolias, Bond. Drafting the article: Kolias, Chari. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Kolias. Statistical analysis: Bond. Administrative/technical/material support: Kolias, Chari. Study supervision: Kolias, Hutchinson.

**References**

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**TABLE 4: Comparison of outcomes of SEPS/hollow screw techniques with conventional techniques from recent meta-analyses**

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Technique</th>
<th>Successful Outcome</th>
<th>Complications</th>
<th>Recurrence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>current review</td>
<td>SEPS/hollow screw</td>
<td>77.6%</td>
<td>unable to calculate</td>
<td>22.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Ducruet et al., 2012</td>
<td>BHC</td>
<td>84.9%</td>
<td>9.3%</td>
<td>11.7%</td>
<td>3.7%</td>
</tr>
<tr>
<td></td>
<td>TDC</td>
<td>93.5%</td>
<td>2.5%</td>
<td>28.1%</td>
<td>5.1%</td>
</tr>
<tr>
<td></td>
<td>craniotomy</td>
<td>74.4%</td>
<td>3.9%</td>
<td>19.4%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Weigel et al., 2003</td>
<td>BHC</td>
<td>79.1%</td>
<td>3.8%</td>
<td>12.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td></td>
<td>TDC</td>
<td>88.1%</td>
<td>3.0%</td>
<td>33.0%</td>
<td>2.9%</td>
</tr>
<tr>
<td></td>
<td>craniotomy</td>
<td>67.8%</td>
<td>12.3%</td>
<td>10.8%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>
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