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Research Article

Routine Drain Placement after Scrotal Hydrocelectomy: the Tradeoff Between Hematoma Formation and Surgical Site Infection

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Abstract

Title: Routine Drain Placement during Scrotal Hydrocelectomy: The Tradeoff Between Hematoma Formation and Surgical Site Infection.

Objective Scrotal hydroceles are a common benign condition affecting many men. Though benign, many men have symptomatic hydroceles and opt for surgical excision. Scrotal hydrocelectomy is the gold standard surgical option with potential complications including infection, hematoma formation, chronic orchialgia, testicular atrophy, and recurrent hydrocele. The scrotum is an elastic compartment, therefore meticulous hemostasis must be achieved to prevent hematoma formation. Additionally, groin and scrotal incisions have a relatively higher infection rate. Many surgeons leave a surgical drain after hydrocelectomy to alleviate the risk of hematoma with a potential increase in the risk of infection. Herein, we sought to elucidate the risk of hematoma formation and postoperative infection with and without drain placement after scrotal hydrocelectomy.

Materials and Methods: Data from the patient charts undergoing hydrocelectomy from 2014 and 2021 were collected after IRB approval. Data collection included demographics, drain status, anticoagulation status, operative duration, postoperative infection and hematoma rates, and concomitant procedures. Data analysis included Fischer's exact test and multiple logistic regression.

Results: A total of 182 patients underwent scrotal hydrocelectomy from 2014-2021 at our institution. The mean age was 61.6 years and the mean BMI was 29.6. Drain placement varied as 88 (48.4%) of patients had no drain placed, 84 (46.2%) of patients had unilateral and 10 (5.4%) had bilateral drain placement. Patients on anticoagulation or antiplatelets encompassed 71 (39%) and 35 (19.2%). 27/182 (14.8%) patients had concomitant scrotal procedures. Forty patients (22%) had any complication after surgery of which 19/182 (10.4%) patients experienced postoperative hematoma and 21/182 (11.5%) patients had a Surgical-Site Infection (SSI). Multiple logistic regression revealed post-operative drain placement was not associated with increased rates of SSI or decreased rates of hematoma. Patients that had concomitant scrotal procedures had higher rates of postoperative hematoma [OR=1.18 (95% CI, 0.65, 1.71, p=0.03)]. One surgeon had higher rates of hematomas encompassing 52.6% of all hematomas.

Conclusions: Scrotal hydrocelectomy remains the gold standard surgical option for patients with symptomatic hydroceles. The benefits of routine drain placement after hydrocelectomy are debated among urologists. Herein, we have demonstrated that drain placement after hydrocelectomy is not associated with decreased rates of hematoma formation or increased post-operative soft-tissue infection rate. Conducting concomitant scrotal procedures was associated with increased postoperative hematoma risk. Additionally, postoperative hematoma appears surgeon/technique dependent. This study supports the need for meticulous hemostasis and limiting concomitant scrotal procedures if possible and drain placement on a case-by-case basis.

Keywords: Hydrocele; Hematoma; Scrotum; Surgical drain

Introduction

Hydrocele is a common, benign urologic condition that results from an abnormal fluid collection between the parietal and visceral layers of the tunica vaginalis. [1] The incidence is about 1% in adult men. [2] This fluid collection is thought to occur when fluid production increases above absorption capability within the tunica vaginalis. Hydroceles may consist of peritoneal fluid, lymph, abscess, blood, bile, or urine. [3] Treatment is typically reserved for symptomatic or very tense and painful hydroceles. Nonsurgical management of hydroceles includes needle aspiration and sclerotherapy with agents such as tetracyclines, ethanolamine oleate, polidocanol, and ethanol. They have usually a high recurrence rate and sometimes are painful procedures. [4-8] However, the gold standard therapy remains surgical excision, for which there are several well-documented surgical techniques. For smaller, or thin-walled hydroceles, the Lord's plication is commonly used, and a drain is not required post-operatively due to the very low risk of hematoma formation. [2,9] For larger, recurrent, or complex hydroceles, excisional techniques have the lowest rates of recurrence. Several excisional techniques have been described, including the Jaboulay, bottleneck, and window operation [10,11].

There is a wide range of reported complication rates after hydrocelectomy, with published studies reporting between 10-71%. [12] The largest and most recent retrospective review reported a 16.1% moderate or severe 90-day complication rate after 866 hydrocele operations. [13] The most common complications after hydrocelectomy are hematoma or infection. [1,13,14] In order to reduce the risk of hematoma formation, many surgeons leave a drain in place in the dependent portion of the scrotum. Surgical drains however are thought to potentially increase the infectious risks. [15] Currently, there are no formal AUA or EAU recommendations on the management of hydroceles and whether a surgical drain should be left post-operatively. In general, the literature is scant on whether surgical drains after hydrocelectomy reduce the incidence of hematoma and the subsequent need for additional interventions or increase the rate of SSI. In the absence of high-quality studies or formal guidelines, the decision regarding drain placement falls to the surgeon on a case-by-case basis. We sought to evaluate the complication rate after hydrocelectomy, depending on drain placement status. Furthermore, we sought to evaluate which patient factors were associated with a higher post-operative infection or hematoma rate.

Materials and Methods

Patient Selection

Following Institutional Review Board approval, we retrospectively collected data on all consecutive patients undergoing hydrocelectomy by all surgeons at our institution from 2014-2021. Collected data included patient demographics, operative time, anticoagulation or antiplatelet status, concomitant procedures performed (if any), drain status, and presence of postoperative hematoma or surgical site infection. The surgeon was also recorded and de-identified using a numerical assignment. Postoperative hematoma status or infection was determined by urological evaluation in the emergency department or in the urology clinic at the follow-up visit. All drains placed were flexible, soft, open drains. No closed suction drains were utilized. Concomitant scrotal procedures performed included spermatocelectomy, cord lipoma excision, vasectomy, scrotoplasty, and orchiopexy. All patients underwent pre-operative antibiotic administration, and the surgical site was cleansed with either betadine or chlorhexidine solution.

Statistical analysis was performed Chi-square or Fisher's exact tests for categorical variables undergoing pairwise analysis. The association between a single variable of interest and multiple dependent variables was analyzed using multiple logistic regression analysis. Wald's z-test was used to determine if the main effects were statistically significant. IBM® Statistical Package for the Social Sciences (SPSS) version 20 (Armonk, New York).

Results

Patient demographics, operative details, anticoagulation/antiplatelet status, and complication rates are listed in Table 1. A total of 182 patients who underwent hydrocelectomy were included in this study. 162 patients had unilateral, and 20 patients had bilateral hydrocelectomy. A total of 94 patients had postoperative drain placement and 88 patients had hydrocelectomy with no drain placement. A total of 84/162 (51.9%) of the patients with unilateral hydrocelectomy and 10/20 (50%) of the patients with bilateral hydrocelectomy had drain placement. There was no significant difference in mean patient age (62.7 vs 60.5, p=0.37), BMI (30 vs 29.2, p=0.45), operative time (92.7 vs 85.3, p=0.38), or concomitant procedures performed (14 vs 13, p=0.78) between those with and those without a post-operative drain. Drain placement did not increase the operative time (92.7 vs 85.3, p=0.38). Forty patients (22%) had any complication after surgery of which 21 (11.5%) had SSI and 19 (10.4%) developed postoperative hematoma. Nine (4.9%) developed chronic orchialgia after hydrocelectomy. Seventy-five (41.2%) patients were taking anticoagulation or antiplatelet agents prior to surgery (Figure 1).

	No Post-Operative Drain	Post-operative drain	p-value
Number of patients, (%), n=182	88 (48.3)	94 (51.7)	
Age, mean, years (SD)	62.7 (17)	60.5 (14.9)	0.37
BMI, mean, kg/m^2 (SD)	29.2 (6.9)	30 (7.3)	0.45
Patients on anti-platelet agents	25	33	0.17
Patients on anti-coagulation agents	6	11	0.34
Operating room time, mean, minutes (SD)	85.3 (71.6)	92.7 (38.9)	0.38
Concomitant scrotal surgery (SD)	13 (1.2)	14 (1.4)	0.78
Post-operative hematoma	12	7	0.23
Post-operative infection	7	14	0.17

Table 1: Demographics, peri-operative details. BMI: body mass index. Anti-platelet agents included: Aspirin 81 or 325mg, clopidogrel, warfarin, heparin or enoxaparin. Anti-coagulation agents included: rivaroxaban and apixaban.

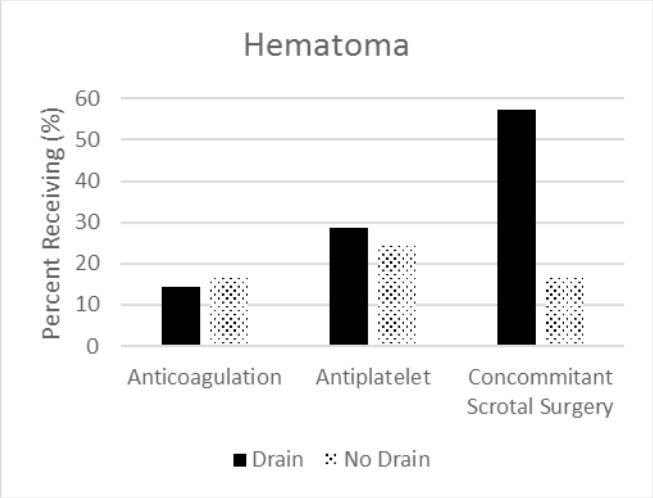

Figure 1: Rates of hematoma in patients taking anticoagulation/ antiplatelet agents or concomitant scrotal surgery.

Postoperative hematoma rates did not vary significantly between those receiving and those without postoperative surgical drain [OR=-0.75 (95% CI, -0.80, -0.69, p=0.15)]. Likewise, patients on anticoagulation or antiplatelet agents, preoperatively, did not have an increased rate of postoperative hematoma [OR=0.28 (95% CI, -0.23, 0.79, p=0.59)]. Patients undergoing concomitant scrotal procedures were more likely to develop a postoperative hematoma [OR=1.18 (95% CI, 0.65, 1.71, p=0.03)]. Neither concomitant procedure [OR=0.37, (95% CI, -0.19, 0.93, p=0.51)] nor drain placement [OR=0.66, (95% CI, 0.17, 1.15, p=0.18)] impacted postoperative surgical site infection rates (SSI). Postoperative hematoma rates appeared surgeon dependent as two surgeons had significantly lower rates of hematoma and one surgeon had a higher rate of post-operative hematoma. These corresponded to 7/18 (39%), p=0.03, 3/46 (6.5%), p=0.02, and 3/46 (6.5%), p=0.02.

Discussion

Hydrocele is a common, benign condition affecting many men. Although observation is an acceptable approach, surgical excision of hydroceles remains the most definitive management option for symptomatic hydroceles. While a variety of surgical approaches exist, post-operative outcomes remain mostly similar. The scrotum is a highly elastic compartment with a capacity to accommodate large amounts of fluid and while hydrocelectomy is generally characterized as a class 1 incision, the groin, and scrotum tend to have higher rates of infection than other clean incisions. Herein, we found that drain placement was not associated with increased rates of SSI. Likewise, we found that post-hydrocelectomy drain placement did not impact the formation of scrotal hematomas. Hematoma rates were

higher in those patients receiving concomitant scrotal operations and appeared to be also surgeon/technique dependent.

Despite the evolution of interventional options for the removal of hydrocele fluid, there is no clear consensus on the placement of a post-operative drain. Drain placement after surgical excision is typically left to the discretion of the surgeon with greater consideration given to patients based on the history of bleeding diathesis and intraoperative findings. However, regarding drain placement in routine cases, evidence remains mixed. In our study of 182 patients undergoing hydrocelectomy, 94/182 (51.6%) of patients had a post-operative drain placed either unilateral or bilateral. A total of 19 (10.4%) patients developed a post-operative hematoma. We found no difference in hematoma rates between those undergoing hydrocelectomy with or without drain placement [(OR=-0.75 (95% CI, -0.80, -0.69, p=0.15)]. Patients undergoing concomitant scrotal procedures had higher rates of postoperative hematomas [OR=1.18 (95% CI, 0.65, 1.71, p=0.03)]. While earlier studies have investigated the risk of complications after hydrocelectomy and reported complication rates of 19-34% [16-19], very few studies have investigated risk factors for developing these complications. A recent Finnish study found that age, BMI, prior sclerotherapy, and surgeon experience were independent risk factors for developing Clavien II-IV complications [13], these factors are often out of the surgeon's control. The results presented herein, indicate that concomitant scrotal surgery is an independent risk factor for developing a postoperative hematoma. While the etiology of this risk is unclear, this increased risk may be due to time constraints while performing multiple procedures or the cumulative bleeding risks of two separate operations (Figure 2).

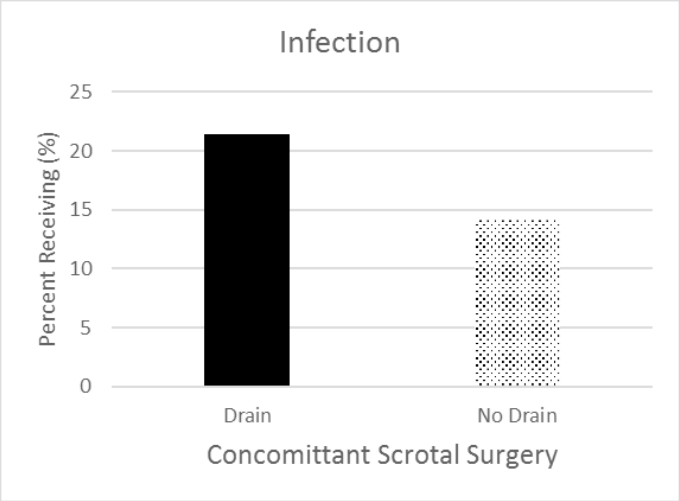

Figure 2: Rates of infection in those receiving post-operative drain versus no drain.

Risk factors for post-hydrocelectomy complications including hematoma rates have predominantly focused on BMI. Only a single study investigated the impact of surgeon experience with junior residents experiencing greater complication rates compared to established surgeons. [13] In our series, we found one surgeon had higher rates of postoperative hematomas while two surgeons had significantly lower rates of hematomas, emphasizing the role of surgical technique and meticulous hemostasis (Table 2). While not directly investigated, some reports have demonstrated a decreased incidence of postoperative hematoma after penile prosthesis placement by placing a compression dressing. [20] Since postoperative scrotal compression dressings are notoriously difficult to place and maintain, meticulous hemostasis should remain a cornerstone of scrotal surgery, particularly when surgical trainees are involved in the procedure (Figure 3).

	Hematoma rates (%)	p-value
Surgeon 1	0.28	**0.03**
Surgeon 2	0.10	0.15
Surgeon 3	0.10	0.27
Surgeon 4	0.06	**0.02**
Surgeon 5	0.16	0.34
Surgeon 6	0.08	0.17
Surgeon 7	0.12	0.39
Surgeon 8	0.03	**0.02**

Table 2: Surgeon versus post-operative hematoma.

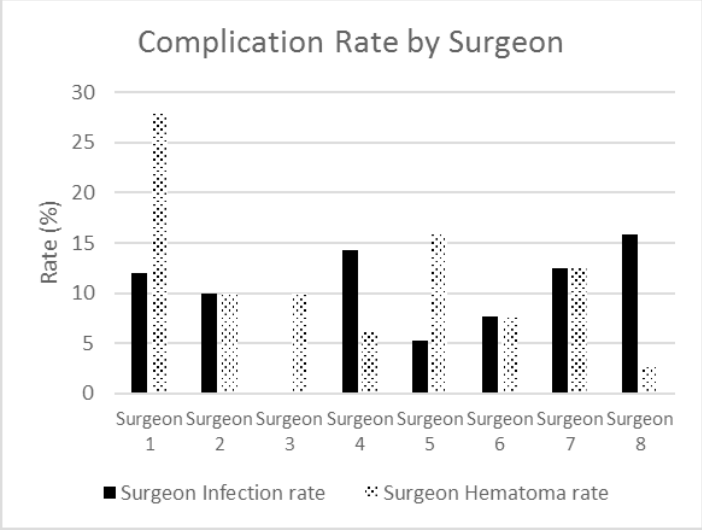

Figure 3: Infection and hematoma rates by surgeon.

Surgical wound classification has remained relatively stagnant since its inception. Scrotal incisions are classified as "clean" surgical incisions, however, due to their location, scrotal and inguinal incisions often have higher rates of infection than other "clean" incisions. Considering this, some advocate against

postoperative scrotal drain placement as drains are thought to provide a conduit for introducing skin flora and increasing the risk of SSI. [15] In our series, 21/182 (11.5%) patients undergoing hydrocelectomy experienced a post-operative SSI which was comparable to studies previously reporting SSI rates between 3.6-12.5%. [13,16-20] Logistic regression analysis revealed that neither concomitant surgeries nor surgical drain placement was risk factor for developing a surgical site infection. Though no previous literature regarding drainage after hydrocelectomy is available, proponents of drain after penile prosthesis placement have found no increase in infectious rates with closed suction drainage systems. [20,21] While drainage does not appear to increase rates of SSI, it does increase patient discomfort, requires removal, and is invasive. Thus surgeons should use surgical drains after hydrocelectomy in selected patients with a higher risk of postoperative hematoma formation. The major limitations of this study include the retrospective nature preventing uniform description of hematoma and surgical site infection. Therefore, recording complication rates were dependent on follow-up visit notes. Likewise, hematomas may have been mistaken for seromas and thus this may not be representative of true complication rates. Also, our hospital is a teaching institution and surgeries like hydrocelectomies are often performed by surgical trainees with direct surgeon supervision. Heavy surgical trainee involvement may lead to increased rates of postoperative complications. Finally, we were unable to capture patients reported to an alternative facility which may further contribute to skew in complication rates. Larger prospective trials are warranted to accurately account for complications and benefits of drain placement after hydrocelectomy.

Conclusion

In our study, patients undergoing routine hydrocelectomy do not have an increased rate of SSI or decreased rate of hematoma following drain placement. Post-operative hematoma rates are higher for those undergoing concomitant scrotal procedures. Post-operative hematoma risks are surgeon dependent likely dependent on attention to hemostasis. As such, surgeons should avoid concomitant scrotal surgeries and consider drain placement just in a selected group of cases at higher risk for hematoma formation to avoid increasing invasiveness of the procedures and patient discomfort.

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