Journal of Pediatric Surgery 53 (2018) 572–575

Contents lists available at ScienceDirect

Journal of Pediatric Surgery

journal homepage: www.elsevier.com/locate/jpedsurg

Operative Technique

Wound complications after chemo-port placement in children: Does closure technique matter?

Colin Muncie [a,*], Richard Herman [a], Anderson Collier [b], Barry Berch [a], Christopher Blewett [a], David Sawaya [a]

[a] Division of Pediatric Surgery, University of Mississippi Medical Center, Jackson, MS
[b] Department of Pediatric Hematology/Oncology, University of Mississippi Medical Center, Jackson, MS

ARTICLE INFO

Article history:
Received 18 May 2017
Received in revised form 20 September 2017
Accepted 7 October 2017

Key words:
Chemo-port
Children
Wound complications

ABSTRACT

Purpose: Wound dehiscence after chemo-port placement is a rare but potentially significant complication. We hypothesize that by using a simple running skin closure technique during chemo-port placement the rate of wound dehiscence and overall wound complications can be significantly decreased.
Methods: IRB approval was obtained and patients <18 years that received a tunneled central line with port from June 2012 to April 2016 were analyzed. Data collected on patients included patient demographics, skin closure type, and wound complications within 30 days. Chi-square was performed to examine the univariate association with skin closure technique and wound dehiscence. Logistic regression was performed to examine the multivariable association between skin closure type and wound dehiscence and to compute odds ratios.
Results: There were 259 ports placed in this cohort: 125 used simple running skin closure technique, and 134 used the subcuticular skin closure. Patients were found to not have any difference in rate of dehiscence or overall wound complications based on gender, age, location of port, or use of steroids or chemotherapy within 1 week of port placement. When compared, only 1 case (0.80%) in the simple running group vs 10 cases (7.46%) in the subcuticular group experienced a wound dehiscence [unadjusted OR = 14.07 (1.69, 116.99) p = 0.0144]. When comparing overall wound complications the simple running group had 3 (2.4%) versus 12 (8.96%) in the subcuticular group [unadjusted OR = 4.78 (1.27, 17.94) p = 0.0203]. When adjusting for port-number both dehiscence and overall wound complications remained statistically significant.
Conclusion: We conclude that the simple running skin closure for chemo-port placement in children has superior outcomes in regards to prevention of dehiscence and overall wound related complications when compared to the subcuticular technique.

A rare but potentially preventable complication after chemo-port placement is wound dehiscence. Dehiscence is defined as the spontaneous opening of an incision after surgery. Studies reporting wound dehiscence, after chemo-port placement are rare [1–5]. The reported incidence of wound dehiscence after chemo-port placement in children is only 1%–4% [2,3]. But this complication often requires removal of the port or at very least local wound care, delaying the use of the port. In March of 2014, after a cluster of wound complications occurred, changes were made to the way chemo-port pockets were closed at our institution. A simple running skin closure was used as opposed to the previously used cosmetically appealing subcuticular skin closure. After several years of performing this technique a decrease in the incidence of wound complications was appreciated. We aimed to perform a retrospective study to review the impact of our change in technique.

1. Methods

After obtaining IRB approval from our institution, all patients <18 years of age that underwent chemo-port placement in the children's hospital from June 2012 to April 2016 were reviewed. Patient demographics, diagnosis, port location, port number (first, second, or third subsequent port for patient), type of closure, and wound related complications within 30 days were collected.

All ports were placed by one of three pediatric surgeons. The port location and type were at the clinical discretion of the surgeon. The position of catheter placement (subclavian or internal jugular) was based on the preference of the surgeon, as was the use of ultrasound. The skin prep technique was based on the preferences of the attending surgeon, which remained constant over the study period. All patients received a single dose of prophylactic antibiotics to cover skin flora before initiating the operation. Both the subcuticular and simple running closures were reinforced with a deep dermal absorbable suture, typically Vicryl. The knotless subcuticular closure was reinforced with adhesive and butterfly strips. Both the subcuticular and simple running techniques were

* Corresponding author at: Department of Surgery, 2500 N. State Street Jackson, MS 39216. Tel.: +1 601 984 5101; fax: +1 601 984 5110.
E-mail address: cmuncie@umc.edu (C. Muncie).

https://doi.org/10.1016/j.jpedsurg.2017.10.044
0022-3468/

performed using 5-0 monofilament absorbable sutures. The fellow was present for the majority of port placements providing some element of standardization of technique. Skin closure type was confirmed by review of operative records or discussion with operating surgeons. If closure type could not be confirmed the port was excluded from further review. Chemo-port revisions, which were defined as new port or port components being placed into an existing pocket, were also included for analysis. The majority of the ports included in this study were of the tunneled type with subcutaneous port (C. R. Bard Inc., Murray Hill, NJ).

The primary outcome was wound dehiscence and secondary outcomes were other wound complications such as wound infection or abscess. Wound dehiscence was defined by separation of the incision requiring intervention. Wound infection was defined as erythema or cellulitis, which was treated with antibiotics. Chi-square tests, Fisher's exact tests, or the Wilcoxon–Mann–Whitney tests were performed as appropriate to examine the univariate association between demographics and skin closure techniques as well as complications. Multivariate logistic regression was performed to examine the association between skin closure technique and complications.

2. Results

276 ports were placed in 251 patients. The most common diagnoses were: leukemia/lymphoma (34%), solid organ malignancy (28%), and hematologic disorders (12%). The port placement skin closure technique could not be confirmed for 11 ports. 6 ports could not be followed up within 30 days (3 transfers to higher level of care, 3 early removals owing to port malfunction). 259 ports placed were eligible for analysis: 125 used the simple running skin closure technique and 134 used the subcuticular skin closure. Patient demographics were similar between groups based on closure type (Table 1).

Fifteen ports experienced a wound complication. Seven isolated dehiscences occurred; 5 were managed with local wound care, and 2 required operative debridement with closure. Wound infections with dehiscence occurred in 3 ports—2 required port removal and 1 was treated with antibiotics and local wound care. Port pocket abscesses occurred in 3 ports resulting in dehiscence and port removal. One isolated wound infection was successfully treated with antibiotics. One port developed pressure necrosis over the port itself requiring removal (see Table 2).

No difference in the rate of wound complications was identified based on gender, age, diagnosis (cancer vs noncancer), location of port, or the use of steroids or chemotherapy within 1 week of port placement (Table 3). Patients who were receiving their 2nd or greater subsequent port in our study were found to have a higher rate of wound dehiscence and wound complication (Table 3). In comparison of chemo-port revisions to primary port placements within new pockets the percentage of wound complications was greater in the revision group. However, these differences were not statistically significant (15% vs. 5%, $p = 0.19$). There was a significantly increased rate of wound dehiscence in the subcuticular group (10 cases, 7.46%) compared to the simple running group (1 case, 0.80%) [p = 0. 0106]. Significantly more overall wound complications also occurred in the subcuticular group (12 cases, 8.96%) compared to the simple running group (3 cases, 2.4%) [p = 0. 0317] (Table 4). When adjusting for port-number in the multivariate model both wound dehiscence and overall wound complications remained statistically significant (Table 5).

Table 1
Demographics table by skin closure technique.

	Total (n = 259)	Subcuticular (n = 134)	Simple running (n = 125)
Gender			
Male	132 (50.97%)	63 (47.73%)	69 (52.27%)
Female	127 (49.03%)	71 (55.91%)	56 (44.09%)
			p = 0.1879
Age			
(Mean ± std)	7.68 ± 5.14	7.31 ± 5.06	8.09 ± 5.20
			p = 0.2074
Diagnosis			
Cancer	182 (70.27%)	99 (54.40%)	83 (45.60%)
Noncancer	77 (29.73%)	35 (45.45%)	42 (54.55%)
			p = 0.1881
Location of Port			
Lower Chest	57 (22.01%)	36 (63.16%)	21 (36.84%)
Upper Chest	109 (42.08%)	51 (46.79%)	58 (53.21%)
Sternum	93 (35.91%)	47 (50.54%)	46 (49.46%)
			p = 0.1287
Steroids or Chemotherapy within 1 week of placement			
Yes	163 (63.18%)	82 (50.31%)	81 (49.69%)
No	95 (36.82%)	51 (53.68%)	44 (46.32%)
			p = 0.6006
Port Number.			
First	212 (81.85%)	113 (53.30%)	99 (46.70%)
Second or greater	47 (18.15%)	21 (44.68%)	26 (55.32%)
			p = 0.2846

3. Discussion

A rare but potentially preventable complication after chemo-port placement is incisional dehiscence. Although rare, this complication can result in a wound infection or an exposed port, requiring removal. A culture change occurred at our center over a short period of time, in which all chemo-ports began to be closed with the simple running skin closure as opposed to the previously used subcuticular skin closure. The subcuticular closure provides very cosmetically appealing results and is commonly used in children. However, it was felt that by applying a more secure type of closure, wound complications could be prevented. An anecdotal decrease in our institution's wound complications was appreciated, and our study confirmed those suspicions. Wound dehiscence in adults is reported as being relatively rare, with an incidence of around 1% [6]. In children however, the incidence is reported to be as high as 4%, with overall wound complications as high as 8% [2]. With smaller physiques, children have less subcutaneous fat between their chest wall and skin. This theoretically causes incisional tension to be a factor in wound healing. While the subcuticular closure has an excellent cosmetic result, it may not provide the support needed for an incision to heal. In a child undergoing port placement for potentially lifesaving therapy, it does not seem to be worth the risk to favor cosmesis over adequate wound healing.

In our study, no increase in wound complications was found in patients that received steroids or chemotherapy within 1 week of port placement. Although this is not unexpected, often when a patient has a wound complication it is attributed to impaired wound healing. Zawacki et al. reported an increase in the rate of wound dehiscence after port placement in adults on bevacizumab therapy [5]. Although we did not demonstrate this finding, we did not review specific chemotherapy agents. Patients who were receiving their 2nd or greater subsequent port in our study were found to have a higher rate of wound dehiscence and wound complications. After further review of our 15 wound complications, 2 of these patients were noted to have been undergoing a chemo-port revision. These are defined as a port being replaced within an existing port pocket. In comparison of chemo-port revisions to primary port placements within new pockets, the percentage of wound complications were greater in the chemo-port revision group. However, these differences were not statistically significant (see Results). Fallon et al., showed that patients that received a lateral inframammary port had higher rates of overall complications including migration rates and need for port exchange [3]. On our review, no particular location was at a higher risk of wound complications.

Ahmed et al. reported a similar type of study in adults utilizing barbed suture after chemo-port placement [7]. All patients in their