ORIGINAL ARTICLE

# Use of angiographic embolization in trauma-induced pediatric abdominal solid organ injuries

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## ABSTRACT

**BACKGROUND:** Knowledge of the utility of angiographic embolization (AE) in pediatric cases of blunt abdominal solid organ trauma injuries is limited. The current study is an examination of AE as an effective and reliable method to control bleeding in patients with persistent bleeding due to blunt trauma-induced abdominal solid organ injury.

**METHODS:** This was a retrospective examination of patients <17 years of age who had experienced blunt abdominal solid organ injury and who presented at a single institution within 4 years. A statistical analysis of the data was performed.

**RESULTS:** The mean length of intensive care unit stay was 4 days for those who underwent embolization (n=11), and the mean length of hospital stay was 12 days. The average pre-AE blood loss, as measured by the decrease in hematocrit (%) from admission to embolization, was −7.33±5.3% ($p<0.001$). The average post-AE blood loss, as measured by the change in hematocrit 72 hours post AE, was 2±0.97% ($p>0.05$). All of the patients were discharged with a full recovery.

**CONCLUSION:** AE was a safe and effective method to control solid organ hemorrhage in pediatric patients with blunt abdominal injuries.

**Keywords:** Angiographic; children; embolization; solid organ injury.

## INTRODUCTION

Injuries are the leading cause of death in all age groups worldwide,[1] and active hemorrhage is the most common cause of death among trauma patients.[2] Abdominal trauma is an important source of mortality and morbidity in children.[3] About 90% of childhood injuries are blunt trauma injuries, and the most common forms are head and limb trauma.[4] Abdominal trauma represents 8% of all childhood blunt trauma cases, and the liver, spleen, and kidney are the primary organs affected.[4] The spleen is the most frequently injured intra-abdominal organ in cases of blunt trauma.[5] Isolated upper abdominal injuries can lead to liver, spleen, and pancreas injuries.[5] Multisystem trauma often occurs in injuries caused by events such as traffic accidents or falling from a significant height.[5]

Since the mid-1990s, angiographic embolization (AE) has been widely used in hemodynamically unstable adult patients with blunt abdominal solid organ injuries that involve the liver, spleen, or kidney.[6,7] Although AE can be successfully performed in such patients, precise knowledge of the utility in children with blunt trauma-induced abdominal solid organ injuries is limited.[3,8,9]

The present study describes the effective and reliable use of AE at a single center to control hemorrhage in hemodynam-

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ically unstable patients with an ongoing hemorrhage due to blunt trauma-induced abdominal solid organ injury.

## MATERIALS AND METHODS

The records of pediatric patients <17 years of age who presented at a single level I trauma center between 2014 and 2018 with a blunt abdominal solid organ injury were reviewed retrospectively. Any existing childhood injuries of the abdominal organs were identified, as well as the severity score of the injury and any evidence of continued bleeding due to the injury. The success and complication rate of an AE procedure was analyzed, including the duration of stay in the hospital and the intensive care unit (ICU), as well as the need for additional blood transfusion.

Abdominal injuries were identified with an intravenous contrast-enhanced abdominal computed tomography (CT) scan. It was then graded according to the American Trauma Surgery Association's organ injury score. Non-operative management was the first treatment approach for all of the patients.

Ongoing hemorrhage was identified by a decrease in the hematocrit percentage observed in serial laboratory measurements. All of the patients who underwent AE received a blood transfusion before the procedure. AE was performed in patients with continued unstable hemodynamics despite the transfusion.

Sedation or general anesthesia was provided in the radiology unit to all of the patients treated with AE. In all cases, arterial access was obtained for all procedures via the right common femoral artery using the Seldinger technique with ultrasound. First, a diagnostic arteriogram was performed with a suitable catheter. If the arteriography indicated vascular injury, a pseudoaneurysm formation, or contrast extravasation, the patient was prepared for an AE procedure. A special catheter suitable for this procedure was used. Once the injured vessel was detected, the blood flow in this artery was then embolized and stopped. In some cases, embolic agents (microparticles and metal coils) were used in combination to provide maximum hemostasis in the injured artery. In patients with pseudoaneurysms, the input and output vessels were angiographically embolized to prevent reperfusion. To optimize perfusion in the injured organ, only the distal part of the damaged artery was embolized.

### Statistical Analysis

### Comparison of Independent Groups (AE/Non-AE)

The data were summarized as mean±SD, median (range), and counts (percentages). The Kolmogorov–Smirnov or Shapiro–Wilk test was used to determine whether the quantitative data exhibited a normal distribution at the group level. An independent sample t-test was conducted to determine whether there was a significant difference between independent groups that confirmed the parametric test hypotheses. The Mann–Whitney U test was used to determine whether there was a significant difference between independent groups that contradicted the parametric hypotheses. Pearson's chi-square test was used in cases where the independent variable was qualitative. A p value of <0.05 was considered significant.

### Comparison of Dependent Groups

The data were summarized using median values (range). The normality of the data distribution was tested with the Shapiro–Wilk test. Friedman's test was used to determine whether there was a significant difference between dependent groups that contradicted the parametric hypotheses. Multiple comparisons were performed using the Bonferroni-corrected Wilcoxon signed-rank test after applying Friedman's test. A p value of <0.05 was considered significant.

Hemorrhage and hematocrit-thrombocyte stabilization parameters were evaluated using Friedman's test (two-sided; p<0.05 significance). After performing Friedman's test for paired comparisons, the Wilcoxon signed-rank test with the Bonferroni correction was applied. No significant difference was observed between the 72-hour post-AE and immediately post-AE hematocrit levels, suggesting controlled hemorrhage. Similarly, no significant difference was observed between the 72-hour and immediately post-AE thrombocyte counts, again suggesting a controlled hemorrhage. All of the patient data were compared based on a Mann-Whitney U test or independent sample t-test two-sided; p<0.05 was considered significant) in the AE group (n=11) and the non-AE group (n=72). IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA) was used to perform the statistical analysis.

Approval for the present study was obtained from the Inonu University Scientific Research and Publication Ethics Committee (No. 2018/2-13).

## RESULTS

### Patient Data

A total of 83 patients were treated for abdominal solid or-

**Table 1.** Patient demographics

| Angiographic embolization | n=11 |
|---|---|
| Age (years) | 11.7±4.8 (1–16) |
| Gender | 7 male (63%), 4 female (37%) |
| Transfusion | 11 patients (100%) |
| Complications | |
| Major | 1 patient (9%) |
| Minor | 3 patiens (27%) |

**Table 2.** Comparison of AE and Non-AE group length of care

| Mean | AE (n=11) | Non-AE (n=72) | p |
|---|---|---|---|
| Length of intensive care unit stay (days) | 4 (2–15) | 2 (2–10) | <0.001 |
| Length of hospital stay (days) | 12 (7–28) | 5.5 (4–30) | <0.001 |

AE: Angiographic embolization.

**Table 3.** Injury grade comparison of AE and Non AE groups

| | Groups | | Total | p |
|---|---|---|---|---|
| | Non-AE | AE | | |
| Grade, n (%) | | | | |
| I | 31 (43) | 0 (0) | 31 (43) | <0.001 |
| II | 29 (40.2) | 0 (0) | 29 (40.2) | |
| III | 12 (16.8) | 0 (0) | 12 (16.8) | |
| IV | 0 (0) | 9 (81.9) | 9 (81.9) | |
| V | 0 (0) | 2 (18.1) | 2 (18.1) | |
| Total, n (%) | 72 (86.7) | 11 (13.3) | 83 (100) | |

AE: Angiographic embolization.

gan injuries between July 2014 and December 2017. Of these patients, 41 were splenic injuries, 27 were liver injuries, and 15 were renal injuries. In all, 72 patients were successfully managed non-operatively and no additional treatment was provided. Eleven patients with abdominal solid organ injury underwent AE due to ongoing hemorrhage-induced hemodynamic instability. A laparotomy was also performed for 1 patient who underwent AE due to an ileal mesenteric defect induced by a fall; resection and anastomosis was performed. Demographic information on the patients who underwent

**Table 4.** Embolized organ injuries

| Patient | Injured organs and grade | Embolized organ |
|---|---|---|
| 1 | Grade IV left kidney | Kidney IV |
| 2 | Grade IVleft kidney | Kidney IV |
| 3 | Grade IV right kidney, grade IV right adrenal, severe TBI | Kidney IV |
| 4 | Grade IV right kidney | Kidney IV |
| 5 | Grade IV spleen | Spleen IV |
| 6 | Grade IV spleen | Spleen IV |
| 7 | Grade IV liver, right lung contusion | Liver IV |
| 8 | Grade V left kidney | Kidney V |
| 9 | Grade IV left kidney | Kidney IV |
| 10 | Grade IV spleen, grade I liver, ileal mesenteric defect | Spleen IV |
| 11 | Grade V left kidney | Kidney V |

Mean injury grade: 4.18±0.30. TBI: Traumatic brain injury.

AE is presented in Table 1. The injury mechanism was a fall (>6 feet) in 5 cases, a motor vehicle accident in 5 cases, and 1 instance of assault.

The mean age of the patients who underwent AE (n=11) was 11.7±4.8 years (range: 1–16 years). The mean length of ICU stay was 4 days (range: 2–15 days), and the mean length of hospital stay was 12 days (range: 7–28 days). The mean organ injury grade was 4.18±0.40. The mean age of the patients who did not undergo AE (n=72) was 9.1±3.8 years. The mean length of ICU stay for these patients was 2 days (range: 2–10 days), the mean length of hospital stay was 5.5 days (range: 4–30 days) (Table 2) and the mean organ injury grade was 1.73±0.75 (Table 3). Table 4 demonstrates that the solid organ injuries were significantly more severe in the patients who underwent AE (p<0.001). The ICU duration

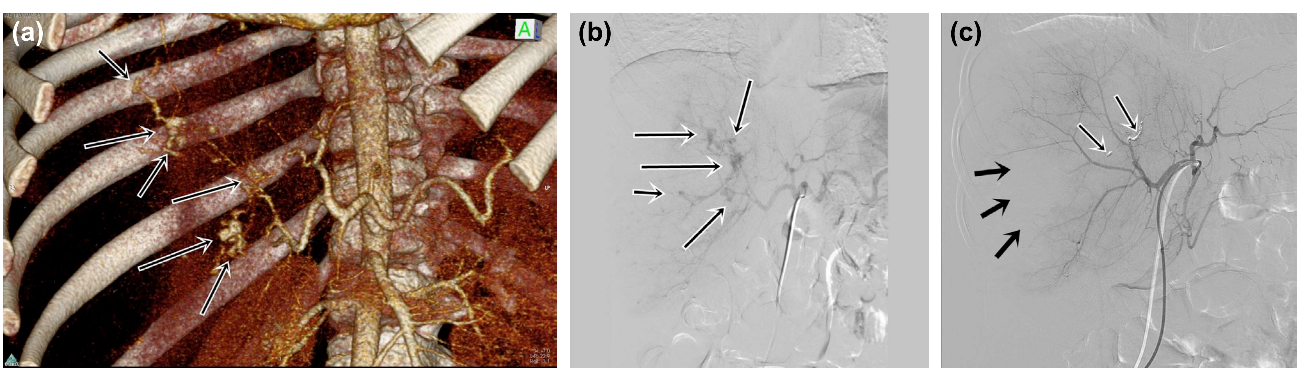


**Figure 1. (a)** Three-dimensional shaded surface display computed tomography angiographic image shows active contrast extravasation of contrast material (hemorrhage) from the right hepatic artery (arrows). **(b)** Non-selective celiac angiographic image demonstrating active hemorrhage from the right hepatic arterial branches (arrows). **(c)** Cessation of active extravasation and patency of remaining hepatic arterial branches seen in a control angiographic image obtained after coil embolization of anterior sectorial branches of the right hepatic artery (white arrows) and gel-foam embolization of posterior sectorial branches of the right hepatic artery (black arrows).

of stay (p<0.001) and hospital stay (p<0.001) were longer in these cases.

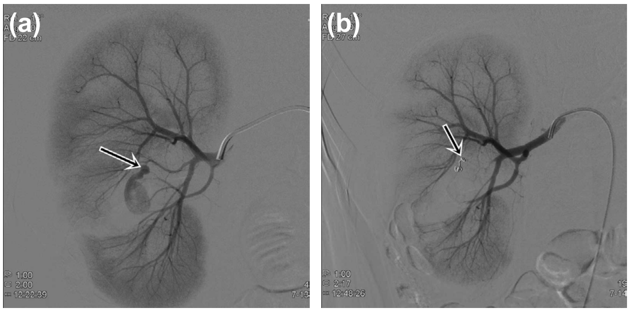


**Figure 2. (a)** Selective renal artery angiography revealing active extravasation. **(b)** Successful angiographic embolization of a grade IV renal injury.

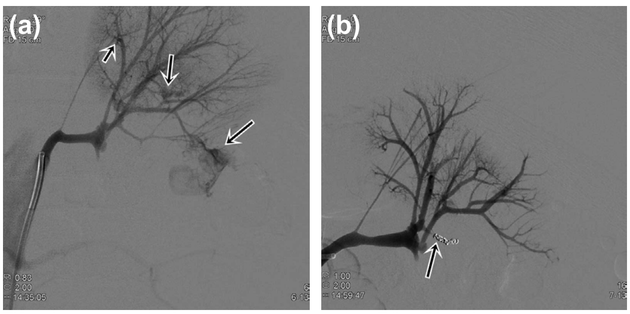


**Figure 3. (a)** Selective renal artery angiography illustrating active extravasation. **(b)** Successful angiographic embolization of a grade IV renal injury.

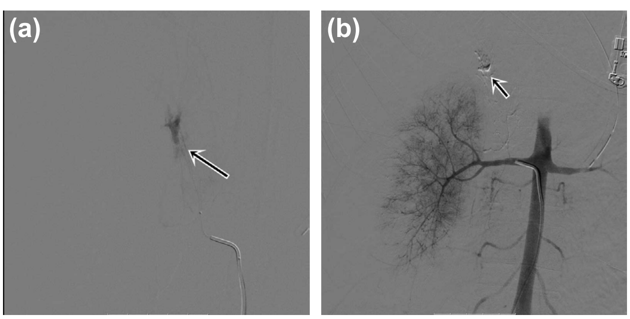


**Figure 4. (a)** Selective renal artery angiography indicating active extravasation. **(b)** Successful angiographic embolization of a grade IV renal injury.

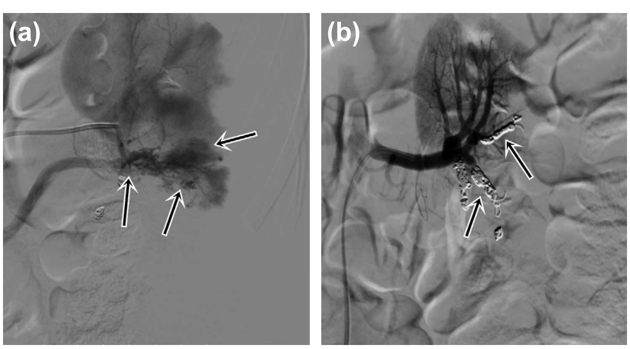


**Figure 5. (a)** Selective renal artery angiography demonstrating active extravasation. **(b)** Successful angiographic embolization of a grade IV renal injury.

## Angiographic Embolization Data

Single-organ AE was performed for 11 children: The group included 1 case of liver injury (grade IV) (Fig. 1), 7 patients with renal injury (5 grade IV, 2 grade V) (Fig. 2–8), and 3 splenic injuries (grade IV ) (Fig. 9–11). There were 3 patients with multiple solid organ injuries. Each of these underwent embolization in a single organ. In patients treated with AE, the mean organ injury grade was 4.18±0.30 (Table 4). AE was performed within 72 hours after admission (range: 1–72 hours). General anesthesia was administered in 3 cases. After the procedure, the mean time spent in the ICU was 22 hours.

## Hemorrhage Data

The mean blood volume measured in the hematocrit before

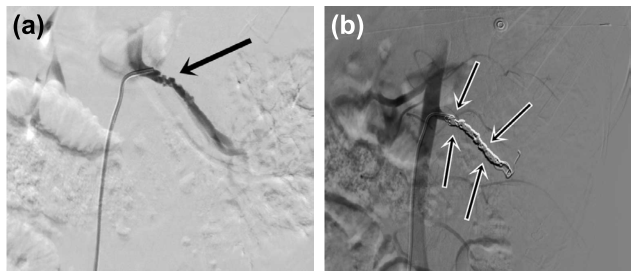


**Figure 6. (a)** Selective renal artery angiography shows transection with pseudoaneurysm formation of renal artery (arrow). **(b)** Successful angiographic embolization of transection with pseudoaneurysm formation of renal artery (arrows).

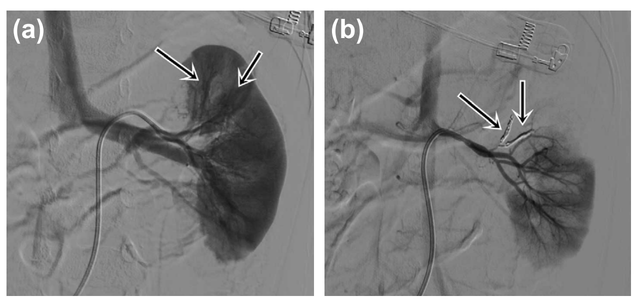


**Figure 7. (a)** Selective renal artery angiography shows active extravasation. **(b)** Successful angiographic embolization of a grade IV renal injury (arrows).

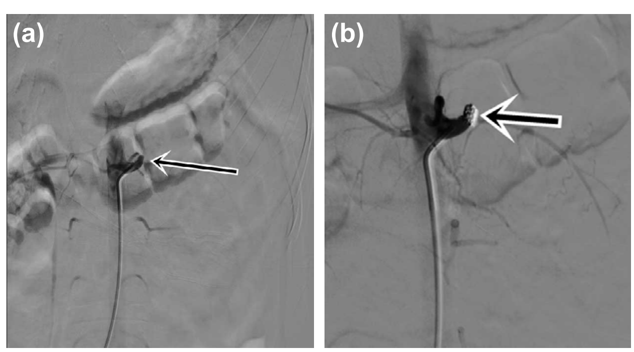


**Figure 8. (a)** Selective renal artery angiography illustrating transection with pseudoaneurysm formation of renal artery (arrow). **(b)** Successful angiographic embolization of transection with pseudoaneurysm formation of renal artery (arrows).

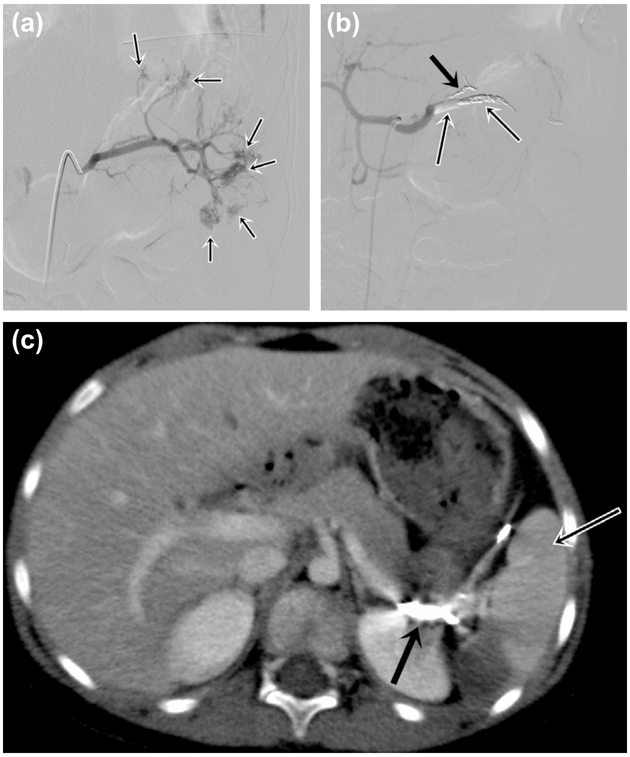


**Figure 9. (a)** Selective splenic artery angiography shows active extravasation and pooling of contrast material in the splenic parenchyma (arrows). **(b)** Non-selective celiac angiographic image demonstrates successful embolization of splenic artery distal to the pancreatic branches (black arrow) with detachable coils (white arrows). **(c)** Control computed tomography image illustrates coils (black arrow) and remaining superior pole of spleen (white arrow).

the AE procedure was 37.33±5.3% ($p<0.001$). The decrease in the thrombocyte count measured between admittance and AE was −129.8±64.6 $X10^3/mm^3$ ($p<0.001$). The data on the change in hematocrit level are presented in Figure 12. The decision to perform AE was based on the hematocrit level; however, the thrombocyte count was also significant in the decision. The mean post-AE blood loss, as measured by the change in hematocrit level between that recorded at the time of the AE and 72 hours post AE, was 2±0.97% ($p>0.05$). The change in thrombocyte count between that observed immediately post AE and 72 hours later was 33.6±22.8 $X10^3/mm^3$ ($p<0.05$). The data on the change in thrombocyte level are presented in Figure 13. A blood transfusion was performed prior to AE in all patients (15 mL/kg red blood cells per patient). Twelve hours after the AE, 1 patient underwent another blood transfusion (15 mL/kg red blood cells) due to ongoing hemorrhage, and this patient was re-embolized. All of the patients were discharged with a full recovery. No deaths were observed.

## Complications

No complications developed during the AE in any of the study patients. A minor complication of pleural effusion subsequently developed in 3 patients, requiring external drainage. Thoracic catheters were installed in 5 patients a mean of 7.7

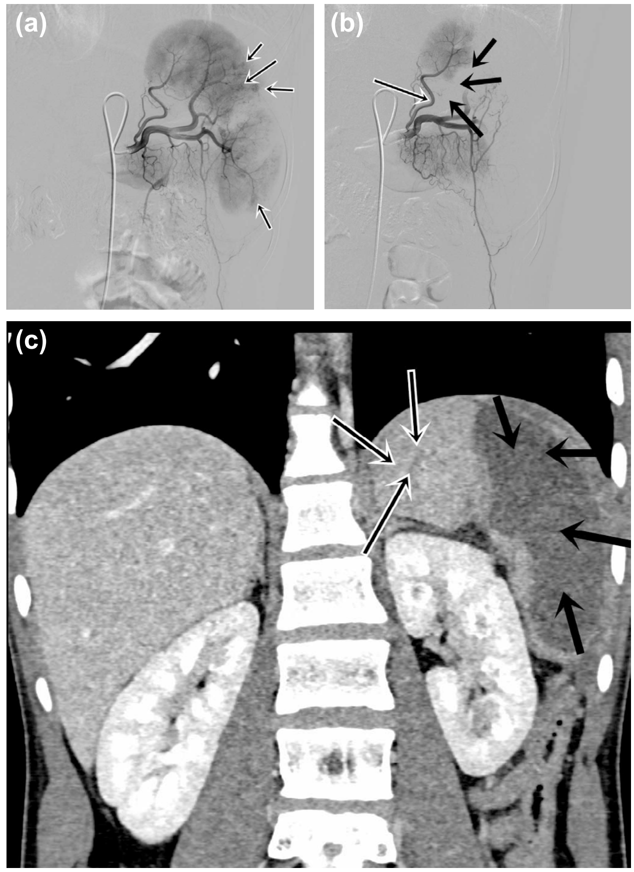


**Figure 10. (a)** Selective splenic artery angiographic image reveals active hemorrhage from superior and inferior splenic branches (arrow). **(b)** Control selective splenic angiographic image obtained after embolization of actively bleeding splenic branches with polyvinyl alcohol particles demonstrates embolization of distal branches (black arrows) and preservation of superior polar splenic arterial branches (white arrows). **(c)** Control coronal computed tomography image illustrates preserved perfused superior pole of spleen (white arrows) and remaining avascular spleen parenchyma (black arrow).

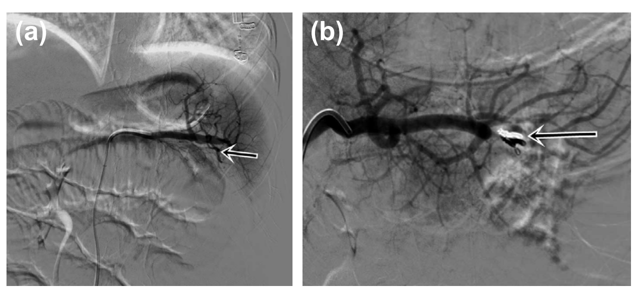


**Figure 11. (a)** Selective splenic artery angiographic image shows injury to the inferior splenic artery branches (arrow). **(b)** Successful angiographic embolization of the inferior splenic artery branches (arrow).

days after the pleural drainage. A major complication developed in 1 patient who experienced ongoing hemorrhage, and a second AE was performed on the same organ. A laparotomy was performed due to findings observed on the upright direct abdominal radiographs taken due to ongoing abdominal pain before the AE and the presence of acute abdomen symp-

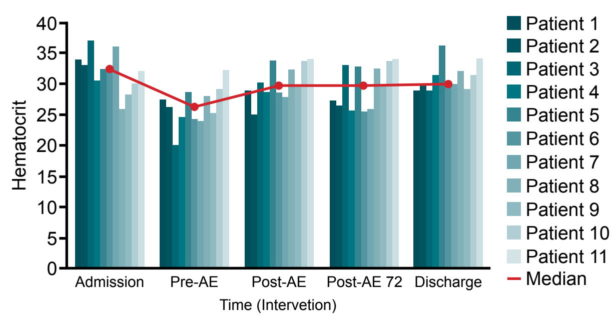


**Figure 12.** Hemorrhage control with angiographic embolization (AE). Serial hematocrit measurements were taken to assess the extent of hemorrhage before and after AE. Before AE, the patients experienced significant hemorrhage (−7.33±5.3%; p<0.001). After AE, the patients' hematocrit levels stabilized (2±0.97%; p=NS). No significant decrease in the hematocrit level (%) was observed at 72 hours post AE.

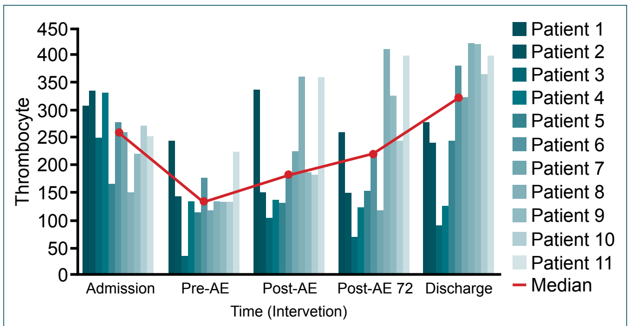


**Figure 13.** Hemorrhage control with angiographic embolization (AE). Serial thrombocyte counts were determined before and after AE. Before AE, the patients showed significantly decreased thrombocyte counts (−129.8±64.6 X10$^3$/mm$^3$; p<0.001). After AE, the thrombocyte counts stabilized (33.6±22.8 X10$^3$/mm$^3$; p=NS). No significant decrease in thrombocyte count (%) was observed at 72 hours post AE.

toms (albeit unrelated to AE). A mesenteric defect developed in a 10-cm ileac segment as the result of a fall, which led to ischemia unrelated to AE. Resection of the ischemic segment and anastomosis was performed. Feeding per oral was initiated after 5 days.

## Non-operative Success

The non-operative management success rate was 100% for the spleen (n=38), liver (n=26), and kidney (n=8). All of the patients were hemodynamically stable and there was no patient mortality.

The mean hematocrit percentage was significantly lower in the AE group compared with the non-AE group (Table 5, Fig. 14). Although the decision to perform AE was based on the change in hematocrit level, it was noted that the mean thrombocyte value was significantly lower in the AE group (Table 6, Fig. 15). The mean hospital and ICU unit stays were significantly longer for patients who underwent AE than

**Table 5.** Hematocrit comparison of AE and Non-AE groups

| Variable | Groups | | p |
|---|---|---|---|
| | AE (n=11) | non-AE (n=72) | |
| | Mean±SD | Mean±SD | |
| Hematocrit % | 28.97±2.16 | 35.95±3.30 | <0.001 |

AE: Angiographic embolization; SD: Standard deviation.

**Table 6.** Thrombocyte comparison of AE and Non-AE groups

| Variable | Groups | | p |
|---|---|---|---|
| | AE (n=11) | non-AE (n=72) | |
| | Mean±SD | Mean±SD | |
| Thrombocyte ×10$^9$/L | 201.03±68.01 | 281±60.28 | <0.001 |

AE: Angiographic embolization; SD: Standard deviation.

those in the non-AE group. This was likely due to the fact that the organ injuries were significantly more severe in the AE group than in the non-AE group (Table 2, Figs. 16 and 17).

## DISCUSSION

Non-operative management of significant abdominal injuries represents standard care for pediatric patients. More than 95% of isolated abdominal solid organ injuries are successfully managed without surgery.[10,11] However, in cases where emergency surgical intervention is required, removal of the damaged organ is often necessary, which can increase both morbidity and mortality.[12,13] AE has been used as an adjunct to non-operative management, although its role in pediatric cases has not been defined.[14–16]

A detailed literature review revealed that although AE is effective for treating solid organ injuries due to blunt abdominal trauma in adults, only a few studies have examined its use in children.[3,17–20] Skattum et al.[17] reported that AE increased the rate of splenic preservation from 90% to 98% during non-operative management of splenic injuries. Gross et al.[20] performed embolization on 15 patients with a splenic injury over a 10-year period and reported that the spleen was preserved in 93% of cases. Kiankhooy et al.[3] successfully treated 7 children with blunt abdominal trauma via AE. Two of these patients had hepatic injuries, 2 others splenic injuries, and 3 had renal injuries. The AE procedure was performed an average of 11 hours after admission. Fenton et al.[21] performed an angiography on 29 children with blunt abdominal trauma, 11 of whom subsequently underwent an embolization procedure.

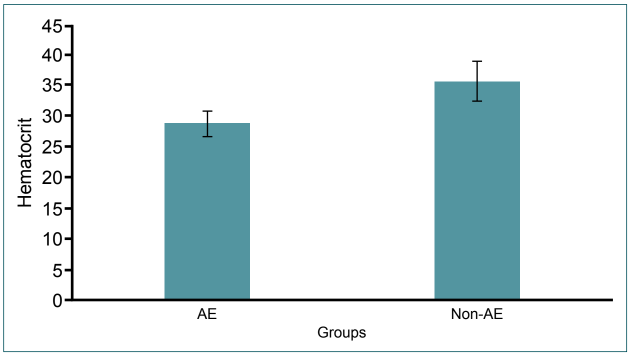


**Figure 14.** Mean hematocrit level of the angiographic embolization (AE) and non-AE groups.

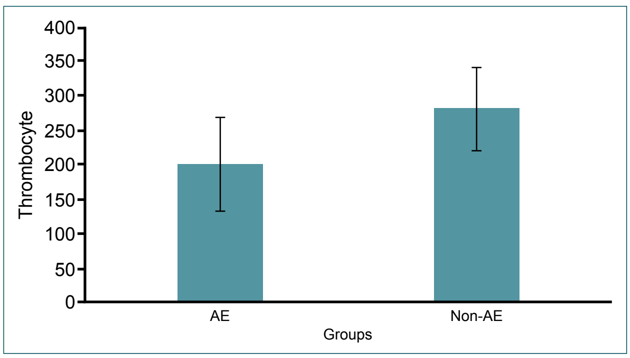


**Figure 15.** Mean thrombocyte level of the angiographic embolization (AE) and non-AE groups.

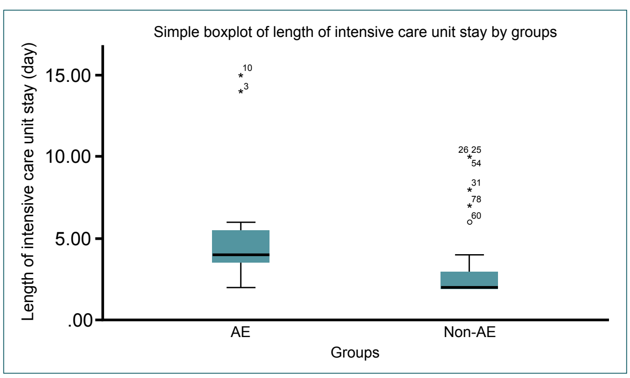


**Figure 16.** Length of intensive care unit stay (days) in the angiographic embolization (AE) and non-AE groups.

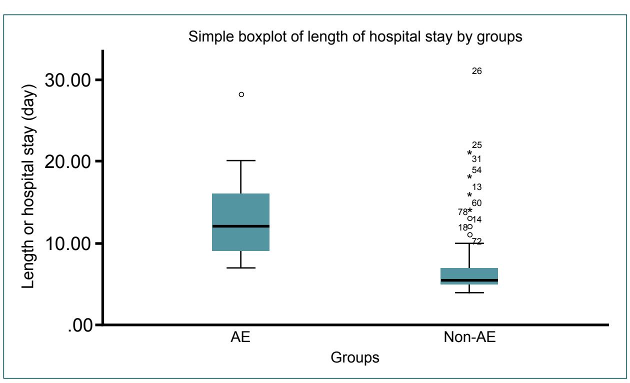


**Figure 17.** Length of hospital stay (days).

In the abovementioned studies, the decision to perform AE was based on a reduction in the hematocrit level in serial blood samples taken from patients with ongoing hemorrhage.[3,17–21] This suggests that AE should be performed when a contrast blush sign is present on a CT scan. Bansal et al.[22] identified a contrast blush on a CT scan in 47 children with blunt splenic injuries and successfully applied non-operative management without AE. Van der Vlies et al.[23] also reported successful non-operative management without AE in 9 blunt splenic trauma patients with contrast blush findings. Zamora et al.[24] reported that AE was performed for patients with high-grade (IV–V) injuries. In the present study, the decision to perform AE was based on a progressive decrease in the hematocrit level in serial blood samples of hemodynamically unstable patients with high-grade (IV–V) injuries. Although there are no studies demonstrating a correlation between hemodynamic instability and an ongoing decrease in the number of thrombocytes, we found a significant decrease in the thrombocyte count in the 11 patients who underwent AE.

The literature includes reports of AE performed for high-grade (IV–V) injuries in pediatric patients with blunt abdominal trauma; however, it is unclear which organ injuries require AE most frequently. Kiankhooy et al.[3] reported that 3 of 7 patients who underwent AE had kidney injuries, 2 had spleen injuries, and 2 had liver injuries. Fenton et al.[21] performed angiography on 29 patients and embolization in 11 cases with splenic hemorrhage. In the present study, 7 of 11 patients with blunt abdominal injury who underwent AE due to ongoing bleeding had kidney injuries, 2 had splenic injuries, and 2 had liver injuries. The number of kidney injuries is noteworthy because 15 of 83 patients who presented with trauma suffered a kidney injury and 7 ultimately underwent AE. Kidney injuries constitute 8% to 12% of all cases of children with blunt abdominal injuries.[25] Children's kidneys are larger than those of adults, less guarded, and more susceptible to blunt trauma injury.[3] In the present study it was also considered that the cause of kidney injury and ongoing hemorrhage might also have been related to urine in the kidney.

Although post-embolization transient hypertension has been reported in patients with a kidney injury who underwent AE,[3] hypertension was not observed in the patients who underwent AE in the current study.

The success of AE in the treatment of splenic injuries after blunt abdominal injury is good.[3] This is probably because the trabecular distribution of splenic vessels allows for targeted embolization while maintaining blood flow to uninjured areas of the organ.[3] Sclafani et al.[26] demonstrated that the spleen maintains reticuloendothelial function after AE. Several studies have proposed the use of AE in splenic trauma cases; however, this approach has not been standardized in adult patients.[27] Capecci et al.[27] reported that AE was used in 19% of splenic trauma cases in centers routinely performing a standard splenectomy, while the rate was 24% in centers for which standard splenectomy was non-routine. In the present study, 2 patients underwent AE due to blunt splenic injuries, and no complications were encountered after AE or discharge.

In pediatric blunt solid organ injuries, the second most frequently injured solid organ is the liver.[28] Vane et al.[28] reported that non-operative management produced better results in blunt liver injuries than operative treatment. It has also been reported that AE may be successful in blunt liver injuries because the blood supply to the liver is provided by the portal vein and hepatic artery, which prevents ischemia. Ohtsuka et al.[29] reported that hemorrhaging stopped 2 hours after AE and Kiankhooy reported that hemorrhaging was brought under control within 3 hours.[3] AE was successful in stopping the hemorrhage after 3 hours in the 2 cases presented in this study. Liver blood flow was normal in 2 patients on a CT scan during the follow-up examination conducted 6 months after discharge.

AE has certain advantages in the case of solid organ injury, depending on the operative intervention.[8] Surgical operation in the case of persistent hemorrhage in a solid organ injury due to blunt abdominal trauma often results in surgical removal of the injured organ.[8] The mortality rate of operative intervention is quite high, reported to be between 10% and 65%.[8] AE intervention maintains organ function, but the organ remains subject to the effects of the traumatic injury.[3]

Some studies have reported complications, such as pleural effusion and transient hypertension, during the post-AE period in pediatric patients; however, ongoing hemorrhage has not been reported.[3] In the present study, a patient with grade IV kidney injury experienced hemodynamic instability 24 hours after the first angiography with a hemorrhage located in a region that did not display any indication of hemorrhage during the angiography. Pleural effusion developed in 3 patients who underwent AE due to blunt kidney injuries, and drainage was performed.

The AE technique can present some difficulties in the pediatric population.[30,31] These include locating the femoral artery for vascular cannulation and reaching the outermost end to stop the bleeding.[30] There were no significant problems in the current group of patients.

Based on the present results, we conclude that AE can be used effectively and safely in pediatric cases of blunt abdominal injury, even on children as young as 1 year of age. An ongoing low hematocrit level is the gold standard marker informing the decision to intervene, and a low thrombocyte count was also a significant indicator of those who would later require intervention. Although the kidneys are the least frequently injured organs among cases of blunt abdominal solid organ injury, the majority of the children who underwent AE in the present study had a kidney injury. We strongly recommend the use of AE for pediatric patients with abdominal solid organ injuries due to blunt trauma if an intervention is required due to ongoing bleeding.

Conflict of interest: None declared.

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ORİJİNAL ÇALIŞMA - *ÖZET*

# Anjiyografik embolizasyonun çocuklarda künt karın travmasına bağlı solid organ yaralanmasında kullanımı

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AMAÇ: Anjiyografik embolizasyon (AE) çocuklarda künt karın travmasına bağlı solid organ yaralanmalarında sınırlı olarak kullanılmaktadır. Bu çalışmada, künt travmaya bağlı karındaki solid organ hasarına bağlı kanamalı hastalarda kanamayı kontrol etmek için AE'yi etkin ve güvenilir bir yöntem olarak kullanma deneyimimizi sunuyoruz.
GEREÇ VE YÖNTEM: Çalışmamız da künt karın solid organ yaralanması geçirmiş ve son dört yıl içinde kliniğimize başvuran 17 yaş altı hastaları geriye dönük olarak araştırıldı. Veriler istatistiksel olarak analiz edildi.
BULGULAR: Embolizasyon yapılan hastaların (AE) (n=11) yoğun bakım ünitesinde (YBÜ) kalış süresi ortalama dört gün olup ortalama hastanede kalış süresi 12 gündü. Ortalama hasta organ yaralanma derecesi 4.18±0.40 idi. Ameliyatsız tedavi uygulanan (embolizasyonsuz) (n=72) yaş ortalaması 9.1±3.8 yıl idi. YBÜ'de ortalama kalış süresi iki gündü (dağılım, 2–10 gün) ve ortalama hastanede kalış süresi 5.5 gündü (dağılım, 4–30 gün). Hastaların ortalama organ yaralanma derecesi 1.73±0.75 idi. AE gerektiren hastalarda solid organ hasarı daha ciddi derecede yüksekti (p<0.001). Bu nedenle yoğun bakım ünitelerinde (p<0.001) ve hastanede kalış süresi uzundu (p<0.001). Hematokritteki düşüş ortalama -7.33±5.3 (p<0.001) idi. AE sonrası hematokrit değişikliği (%) ile AE sonrası 72 saatlik ortalama AE sonrası kan kaybı 2±0.97 (p>0.05) idi. Tüm hastalar şifa ile taburcu edildi.
TARTIŞMA: Anjiyografik embolizasyon, künt karın travmasına bağlı solid organ yaralanması olan çocuk hastalarda kanama kontrolü için etkili ve güvenilir bir yöntem olarak kullanılabilir.
Anahtar sözcükler: Anjiyografik embolizasyon; çocuk; solid organ yaralanması.

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