KSSS 2026
The 43rd International Congress of Korean Society of Spine Surgery
May 20 (Wed) - 22 (Fri), 2026
Lotte Hotel Seoul (Sogong-dong), Seoul, Korea

Massive Pleural Effusion and Ascites Causing Decompensated Respiratory Failure Following Biportal Endoscopic Spine Surgery in Multilevel Degenerative Lumbar Pathologies: A Case Report

Jaeyoung Kim, MD

Department of Orthopedic Surgery, Hanil General Hospital, Seoul, Republic of Korea

Jin-Hyok Kim[1] | Jaeyoung Kim[1] | Seung Woo Suh[2] | Hong Jin Kim[2]*

[1]Hanil General Hospital | [2]Korea University Guro Hospital, Seoul, Republic of Korea

Background

- What is BESS?
  - Two independent portals for excellent surgical visualization
  - Outcomes equivalent to open procedures
  - Indications expanding to multilevel pathologies
- Key Risk : Irrigation fluid
  - Continuous saline under hydrostatic or pump pressure
  - Expands field, suppresses bleeding, clears debris
  - High pressure → risk of extravasation into tissue planes
- Purpose
  - Fluid complications documented in hip / shoulder arthroscopy
  - Systemic complications in spinal endoscopy: extremely rare
  - No established guidelines for prevention or management

Case presentation

- Patient profile
  - Age/gender : 81 / female
  - Chief complaint : acute dyspnea, drowsy mental status
  - PMHx. : HTN, DM
  - Prior surgery : Multilevel BESS (L3-4, L4-5, L5-S1)
  - ABGA : pH 6.89 | pCO_2 75.7 | pO_2 92.9 mmHg

- Clinical course
- Admission
  - Endotracheal intubation for airway protection → ICU admission
- HD 1
  - CT & X-ray: bilateral pleural effusion + massive ascites
  - Paracentesis: saline-like fluid confirmed
  - Left pleural PCD performed
- HD 4
  - Mental status → alert | Successfully extubated
- HD 8
  - Stable vitals → transferred to general ward
- HD 22
  - Discharged | Complete clinical resolution

Preoperative MRI — Lumbar Spine

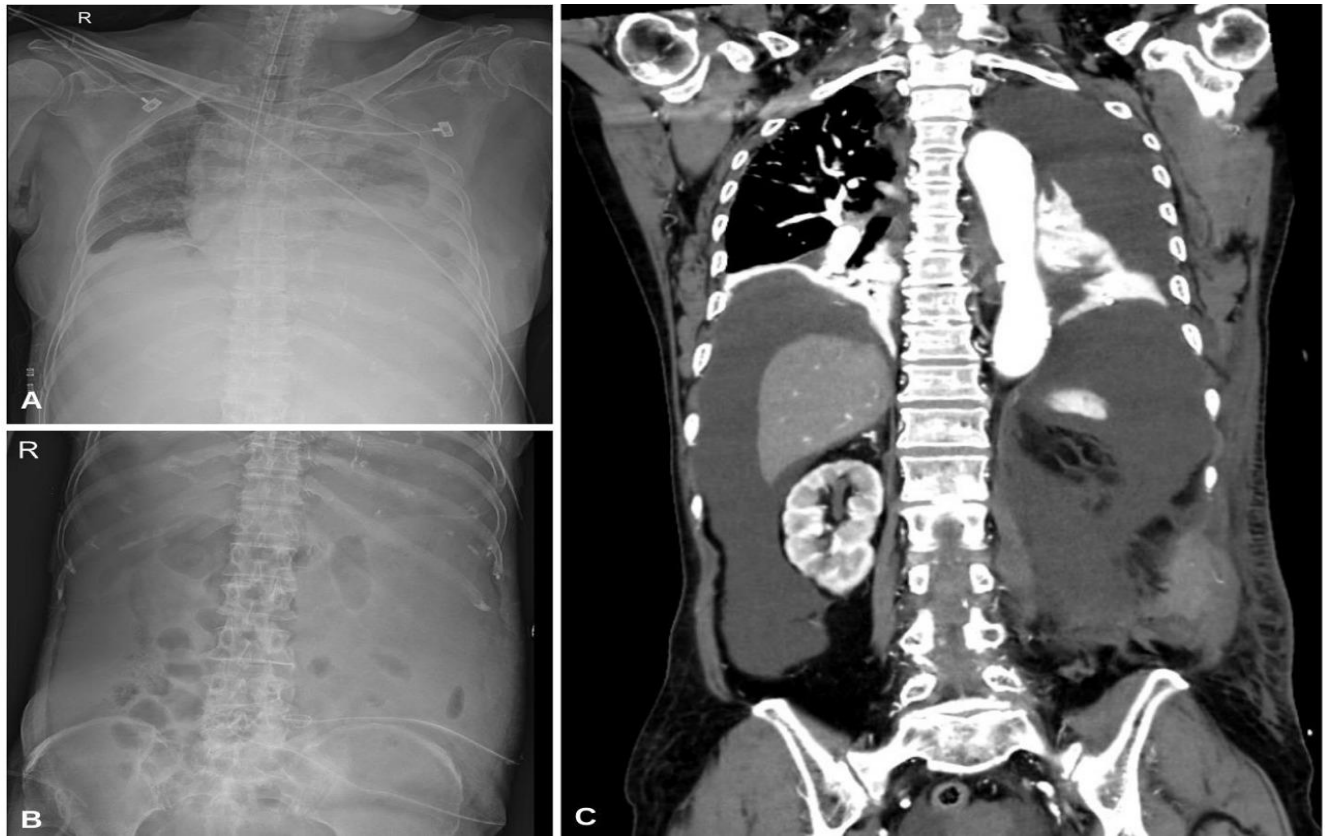
Figure 1

A : T2 Mid-sagittal	B : T2 Left-sagittal	C : Axial L3-4	D : Axial L4-5	E : Axial L5-S1

Multilevel stenosis L3-S1: partial laminectomy at L3-4, L4-5 + left foraminotomy at L5-S1 via BESS

Pleural Effusion & Ascites

Figure 2



A: Chest X-ray (AP) — Bilateral pleural effusion

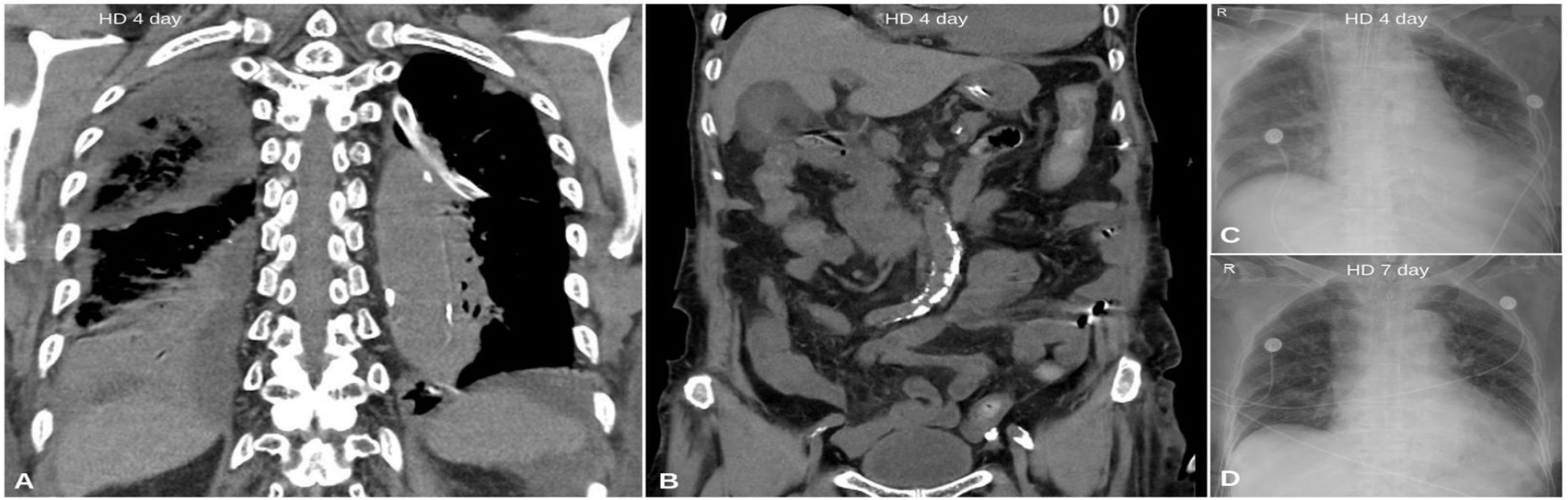
B: Abdominal X-ray — Massive distension (L-sided)

C: CT Coronal — Bilateral effusion + peritoneal fluid

Fluid analysis (paracentesis) → red cells 170/μL, WBC 7/μL, protein 0 g/dL, glucose 54 mg/dL → Consistent with saline irrigation fluid

Follow-up Imaging After Intervention

Figure 3



A: CT Chest — HD 4 Bilateral effusion post-PCD	B: CT Abdomen — HD 4 Residual ascites	C: CXR HD 4 | D: CXR HD 7 Gradual lung re-expansion

PCD left pleural	ICU: 4 days	Extubated HD 4	Ward HD 8	Discharged HD 22

Discussion – 1 Mechanism of Fluid Extravasation

1

High Pressure Irrigation

Continuous saline under p ump pressure exceeds tiss ue resistance

2

Fascial Breach

Lumbodorsal fascia compr omised → fluid enters retr operitoneal space

3

Cavity Overflow

Abdominal compliance ov erwhelmed → intra-abdo minal pressure rises

4

Thoracic Spread

Fluid tracks through diaphr agmatic hiatuses into pleu ral cavity

- Risk factors in this case
  - Multilevel surgery (L3-S1) → prolonged operative time (160 min)
  - Elderly patient (81 y/o): looser connective tissue, poor muscle quality
  - High-volume irrigation required for multilevel decompression
  - L5-S1 level: thin fascial barrier to retroperitoneal space

- L5-S1 Unique Anatomical Risk
  - The L5-S1 level is adjacent to the retroperitoneal space with a thin or absent fascial barrier to the psoas muscle.
  - Combined with the prolonged operative time and high irrigation volume of multilevel surgery, this level significantly facilitates direct fluid extravasation into the retroperitoneal and perirenal spaces.

Warning Signs & Prevention

- Intraoperative Warning Signs
  - Increased irrigation fluid requirement
  - Frequent cutoff of pump irrigation system
  - Abdominal distension intraoperatively
  - Acute hypothermia
  - Altered vital signs / hemodynamic changes

Prevention Strategy

Pre-op	• Careful patient selection (avoid in CHF, liver/renal failure) • Consider tubular retractor or anterior approach for multilevel cases
Intra-op	• Monitor warning signs continuously • Strict fluid balance + minimize operative time
Post-op	• Close monitoring 2–3 days • Early ABG + imaging if respiratory distress • → Timely PCD/paracentesis

Discussion - 2 Comparison with Arthroscopic Complications

Verma & Sekiya (Arthroscopy 2010): 5 cases of fluid extravasation after hip arthroscopy — 1 death, 3 intra-abdominal, 1 intra-abdominal + intrathoracic accumulation

	Hip/Shoulder Arthroscopy	This BESS Case
Cavity involved	Intra-abdominal	Retroperitoneal + Intraperitoneal + Pleural
Clinical course	Mostly compensated	Decompensated respiratory failure
Intervention	Furosemide / laparotomy	Intubation + ICU + PCD + paracentesis
Outcome	1 death reported	Full recovery (HD 22)

BESS should not be regarded solely as a localized spinal procedure — systemic hemodynamic consequences comparable to major arthroscopic complications are possible.

Verma M & Sekiya JK. Arthroscopy 2010;26(6):S90–94. | Abutalib RA et al. Am J Case Rep 2020.

Conclusion

1

Massive pleural effusion and ascites are rare but potentially fatal complications following multilevel BESS, capable of pro gressing to decompensated respiratory failure.

2

Multilevel surgery, prolonged operative time, high irrigation volume, elderly age, and L5-S1 anatomy each amplify the ris k of systemic fluid extravasation.

3

BESS must be recognized as a procedure with potential syste mic hemodynamic consequences — comparable in severity to major arthroscopic complications.

4

Careful patient selection, vigilant intraoperative monitoring, and early ABG + CT imaging are critical for prompt diagnosis and life-saving intervention.