

A case series of medical disputes related to chronic pain management in South Korea between 2009 and 2019

An analysis of the Korean Society of Anesthesiologists database

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Abstract

As interventional pain management has been growing rapidly worldwide and chronic pain management is provided by a diverse range of practitioners, malpractice litigation has increased. Therefore, we examined the characteristics of medical disputes related to chronic pain management from 2009 to 2019 in South Korea.

In this retrospective study, we analyzed the Korean Society of Anesthesiologists database covering case files from July 2009 to June 2019. We compared characteristics of patients, treatment details, mechanisms of injury, specific complications, clinical manifestations of injury, and outcomes between the first half (2009–2014, n=33) and the second half (2014–2019, n=65) of the study period using the Korean Society of Anesthesiologists Legislation Committee database.

During the 10-year study period, the proportion of cases for chronic pain management in cases referred for surgical anesthesia or chronic pain management increased annually by 2.9% ($R^2=0.489$, 95% confidence interval: 0.5%–5.2%, $P=.024$). While invasive procedure-related cases decreased from 63.6% in the first half to 38.5% in the second half ($P=.019$), complex regional pain syndrome-associated cases increased from 30.3% (10/33) to 55.4% (36/65) during this period ($P=.019$). The proportion of cases involving non-anesthesiologists in invasive procedure-related cases increased from 14.3% in the first half to 64.0% in the second half ($P=.002$). The majority of invasive procedure-related cases (82.6%, 38/46) were determined as 'directly related to the procedure'. Of these, the 3 most common damaging events were bleeding, intrathecal injection of local anesthetics, and infectious complications (each $n=6$).

During a recent decade, there were several typical changes in the characteristics of medical dispute cases related to chronic pain management, including an increasing trend of cases for chronic pain management relative to surgical anesthesia-related cases, a higher severity of complications in cervical procedures, an increase in complex regional pain syndrome-related cases, and an increase in cases involving non-anesthesiologists.

Abbreviations: CRPS = complex regional pain syndrome, KSA = Korean Society of Anesthesiologists, NAIC = National Association of Insurance Commissioners.

Keywords: adverse effects, chronic pain, malpractice medical legislation, pain management

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1. Introduction

Treatment with pain medicine, including interventional pain management, has been growing rapidly worldwide with the introduction of new techniques, drugs, and devices.^[1,2] Chronic pain management is provided by a diverse range of practitioners, including but not limited to anesthesiologists. The resulting variations in practitioners' knowledge and training in procedural skills may lead to increases in malpractice litigations involving chronic pain management.

The Korean Society of Anesthesiologists (KSA) Legislation Committee has constructed a database based on expert consultation referrals on anesthesia or chronic pain management-related issues beginning in July 2009. The KSA Legislation Committee reported a first analytical paper on chronic pain management using this database covering case files from July 2009 to June 2016.^[3] Unlike the American Society of Anesthesiologists Closed Claims Project database,^[1,4] our database includes expert consultation referrals for unsettled medical disputes. Thus, the KSA database has the advantage of avoiding the time delay between occurrence of an injury and its appearance within the closed claims database, allowing for analyses of more contemporary cases.

As a follow-up to a previous study,^[3] we investigated changes in characteristics of medical disputes involving chronic pain management over the past decade. We therefore compared injuries and dispute characteristics in a subset of cases associated with chronic pain management between the first half (July 2009–June 2014) and second half (July 2014–June 2019) of the study period.

2. Methods

This was a retrospective study of case files on chronic pain management registered in the KSA Legislation Committee database between July 2009 and June 2019. A detailed description of the data collection process has previously been reported.^[3,5] Briefly, each member of the KSA Legislation Committee reviewed a newly assigned case file (typically, medical records, testimony records of involved personnel, and/or autopsy reports, if performed) and registered it online using a standardized data collection form. Then, online peer review process was performed by all committee members, and the registration of the case into the KSA database was finalized.

The Institutional Review Board of Samsung Medical Center approved the study (approval number: SMC 2020-03-102, approval date: March 20, 2020) and waived the requirement for informed consent.

During a 10-year period, 463 cases were referred to our committee for expert consultation. Simple academic consultation cases with inadequate details ($n = 52$) and cases involving surgical anesthesia ($n = 225$) were excluded. Due to repeated consultation requests, a further 88 cases were excluded, leaving a total of 98 cases eligible for final analyses (Fig. 1). For the analyses, the case files were grouped into the first half (July 2009–June 2014; $n = 33$) and the second half (July 2014–June 2019; $n = 65$), based on the referral time points.

2.1. Description of the variables

The characteristics of the patients and practitioners, the cause of referral (dissatisfaction with treatment outcome without any complications, determination of the appropriateness of the diagnosis or treatment, or the development of complications), treatment details, the mechanism of subsequent injury, and the outcomes were recorded. A causative injury profile was also

included for cases associated with complex regional pain syndrome (CRPS).

With the exception of case files involving CRPS, all cases were divided into 2 broad categories based on the mode of treatment (i.e., invasive procedures and non-invasive pain management). Invasive procedures included nerve blocks, injections, ablative procedures, and insertion or removal of an implantable device. Non-invasive pain management included non-parental medications, hot or cold therapy, and various physical therapies. If multiple treatments occurred, the case was categorized according to the treatment implicated in the complaint and the source of the alleged injury.

Invasive procedures were divided into subclasses according to the involved anatomical site: the spine, the head and neck, the upper extremities including the shoulder, the trunk (chest, abdomen, back, and groin), the lower extremities, and multiple sites. “Invasive procedures at the spine” included neuraxial procedures (epidural procedures including epiduroscopy and neuroplasty, root block, and intrathecal procedures) and paravertebral procedures such as facet joint block. If it could not be determined which procedure caused the injury, the case was assigned to the “multiple sites” subcategory.

Damaging events were defined as the primary mechanism by which an injury or complication occurred. These events were independently judged by each case file reviewer and divided into 2 categories – directly related or not directly related – according to whether they were or were not directly related to the procedure, respectively.

The severity of the injury in each case was scored using the 10-point scale of the National Association of Insurance Commissioners (NAIC), which ranges from 0 (no obvious injury) to 9 (death).^[6] The NAIC severity scale includes the following categories (examples are given in parentheses):

- 0: No obvious injury
- 1: Emotional only (fright, no physical damage)
- 2: Temporary insignificant (lacerations, contusions, minor scars; no delay in recovery)
- 3: Temporary minor (infections, fracture, fall in hospital; delayed recovery)
- 4: Temporary major (burns, procedural material left, drug side effect, brain damage; delayed recovery)
- 5: Permanent minor (loss of fingers, loss or damage to organs; includes non-disabling injuries)
- 6: Permanent significant (deafness, loss of a limb, loss of an eye, loss of 1 organ)
- 7: Permanent major (paraplegia, blindness, loss of 2 limbs, brain damage)
- 8: Permanent grave (quadriplegia, severe brain damage, lifelong care or fatal prognosis)
- 9: Death

The severity scores were grouped into 3 broad categories for analyses: temporary or non-disabling injuries (score 0–5), permanently disabling injuries (score 6–8), and death (score 9). The severity of the injury represented the latest assessment at the time the case was referred.

2.2. Statistical analyses

Categorical variables were compared between the 2 time periods using Pearson χ^2 test with a continuity correction or Fisher exact test, as appropriate. Continuous variables were tested for

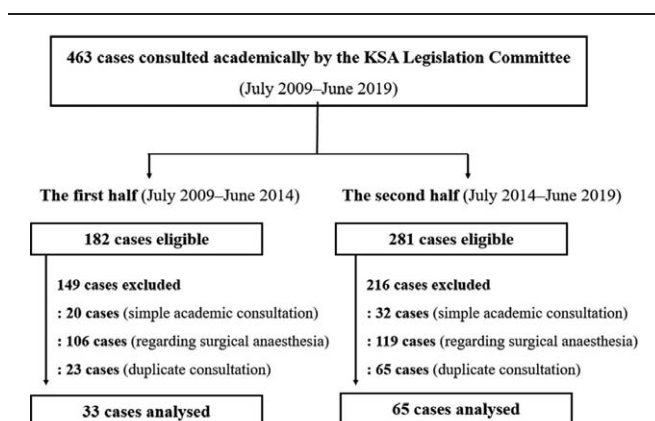


Figure 1. Flow diagram of case selection. KSA = Korean Society of Anesthesiologists.

normality using the Kolmogorov–Smirnov test. Normally distributed variables were analyzed using the unpaired *t* test, while non-normally distributed continuous variables and ordinal variables were analyzed using the Mann–Whitney *U* test.

In addition, we applied a time series analysis to assess an annual trend of the proportion of cases regarding chronic pain management in cases referred for surgical anesthesia or chronic pain management. The trend of the series was calculated using a linear regression model, and the coefficient of determination (R^2) was used to assess the goodness of fit.

Statistical analyses were performed using MedCal for Windows v. 18.11.3 (MedCal Software, Ostend, Belgium). In all analyses, $P < .05$ was taken to indicate statistical significance.

3. Results

Of 98 cases included in the final analyses, 33 were referred in the first half of the study period (July 2009–June 2014) and 65 were referred in the second half (July 2014–June 2019). In total, 15 cases resulted in death, in which the majority of cases (12/15, 80.0%) involved invasive procedures.

When eliminating simple academic consultation cases and repeated consultation referrals of the identical case, 139 and 184 cases were referred for surgical anesthesia or chronic pain management in the first and second halves of the study period. While the numbers of cases regarding surgical anesthesia were similar (106 cases in the first half vs 119 cases in the second half), the proportion of cases for chronic pain management increased from 23.7% (33/139) in the first half to 35.3% (65/184) in the second half ($P = .025$). Time-series analysis showed a linear increase (2.9% per year, 95% confidence interval: 0.5%–5.2%) in the proportion of cases for chronic pain management ($R^2 = 0.489$, $P = .024$) (Fig. 2).

During the first half of the analyzed time period, invasive procedure-related cases comprised 63.6% (21/33) of all cases for chronic pain management, decreasing to 38.5% (25/65) in the second half ($P = .019$). However, the proportion of CRPS-associated cases increased from 30.3% (10/33) in the first half to

Table 1

Comparison of case distribution based on the mode of treatment between the first half (July 2009–June 2014) and second half (July 2014–June 2019) of the study period.

	2009–2014 (n=33)	2014–2019 (n=65)	P value
Invasive procedures	21 (63.6%)	25 (38.5%)	.019*
Spine	16	10	
: cervical/thoracic/lumbosacral	4/0/12	4/0/6	
Head and neck	1	2	
Upper extremities and shoulder	2	3	
Trunk	2	5	
Lower extremities	0	3	
Multiple sites	0	2	
Non-invasive pain management	2 (6.1%)	4 (6.2%)	.985
CRPS-associated cases	10 (30.3%)	36 (55.4%)	.019*

Values are expressed as number of cases (proportion).

CRPS=complex regional pain syndrome.

*Statistically significant at $P < .05$.

55.4% (36/65) in the second half ($P = .019$) (Table 1, Fig. 2). There were 6 cases for non-invasive pain management during the study period, which included medication-related fatalities ($n = 3$), aggravated pain after interferential current therapy ($n = 1$), and overtreatment raised by private insurance companies ($n = 2$).

3.1. Characteristics of the CRPS-associated cases

The patient demographic characteristics and patterns of injury in the CRPS-associated cases did not change over time. In cases associated with CRPS, the median (interquartile) age of the patients at the time of injury was 41.5 (29.0–48.3) years, and 78.3% of the patients were male.

Except for 2 cases (septicemia or nerve injury developed during treatment for CRPS), all cases were referred due to dissatisfied diagnosis/impairment rating for CRPS or inciting events itself. The majority of the cases (73.9% [34/46] of the CRPS-associated cases) arose from claims regarding financial compensation, such as requests for determination of the appropriateness of a diagnosis or treatment from private insurance companies ($n = 9$) or public institutions ($n = 25$). Of the financial compensation claims related to public institutions, the National Workers' Compensation and Welfare Service and Ministry of Patriots' and Veterans' Affairs were subjects for 16 and 9 cases, respectively. The remaining 12 cases were associated with medical malpractice claims.

The most common type of inciting events present in 26.1% of cases was traffic accidents, followed by industrial injuries and iatrogenic injuries at 21.7% each, injuries from military training at 17.4%, and injuries during daily life at 13.0% (Table 2).

Of the CRPS cases related to iatrogenic injuries, 6 cases occurred after surgery; surgery on an extremity ($n = 5$) and percutaneous lumbar laser discectomy ($n = 1$). The causes of the remaining cases were determined as the application of postoperative compression stocking ($n = 1$), venipuncture ($n = 1$), and arterial cannulation ($n = 2$).

3.2. Characteristics of the invasive procedure-related cases

According to the diagnostic entity in the 11th version of the International Classification of Diseases of the World Health

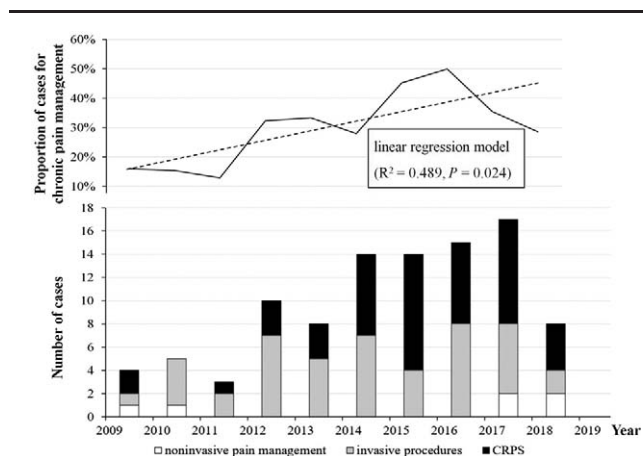


Figure 2. The upper panel shows an annual trend of the proportion of cases for chronic pain management in cases referred for surgical anesthesia or chronic pain management during a 10-year study period. A dotted line indicates a linear regression model (R^2 [coefficient of determination]=0.489, $P = .024$). The lower panel shows an annual distribution of cases for chronic pain management based on the mode of treatment (non-invasive pain management, invasive procedures, and complex regional pain syndrome [CRPS]).

Table 2
Comparison of characteristics of CRPS-associated cases between the first half (July 2009–June 2014) and second half (July 2014–June 2019) of the study period.

	2009–2014 (n=10)	2014–2019 (n=36)	P value
Sex (female/male)	3/7	7/29	.777
Age (yr)	44.1 ± 10.5	38.8 ± 12.8	.232
Type (I/II)	7/3	26/10	1.000
Cause of referral:			
Inappropriateness of the diagnosis or treatment/development of complication	9/1	35/1	.909
Causative injury profile:			
Industrial/iatrogenic/traffic/military/daily life	1/2/3/1/3	9/8/9/7/3	.390
Subject of dispute:			
Private insurance companies/public institutions/others	3/6/1	6/19/11	.358
SCS insertion (yes/no)	4/6	9/27	.357

Data are expressed as number of cases or mean ± standard deviation.
 CRPS = complex regional pain syndrome, SCS = spinal cord stimulator.

Organization,^[7] a total of 46 cases related to the invasive procedure were divided into chronic primary pain (n=2), chronic cancer pain (n=1), chronic posttraumatic and postsurgical pain (n=1), chronic neuropathic pain (n=2), and chronic musculoskeletal pain (n=40). There were no case of chronic headache and orofacial pain or chronic visceral pain. In terms of anatomical site, lumbosacral spine interventions represented the largest share of the invasive procedure-related cases in both periods, with 12 cases (36.4%) in the first half and 6 cases (24.0%) in the second half.

The proportion of cases involving non-anesthesiologists increased from 14.3% (3/21) in the first half to 64.0% (16/25) in the second half ($P=.002$).

The severity of complications that developed due to invasive procedures was similar between the first and second halves of the study period according to their NAIC scores (5.3 ± 2.8 vs 5.3 ± 3.3 , respectively) (Table 3). Subgroup analysis revealed that the severity of the injuries in cases involving non-anesthesiologists was higher than in cases involving anesthesiologists, with a higher proportion of death (57.9% [11/19] vs 7.4% [2/27], $P<.001$).

3.3. Damaging events in the invasive procedure-related cases

During the 10-year period analyzed, the majority of invasive procedure-related cases (82.6%, 38/46) were determined to be

“directly related to the procedure.” Four cases of sensory or/and motor deficits were classified as being of unknown cause due to an inability to distinguish between exacerbation of pre-existing condition and newly acquired injury.

The 3 most common specific damaging events were bleeding, inadvertent intrathecal injections of local anesthetics, and infectious complications (each n=6). All of invasive procedures-related bleeding resulted in temporary injuries. These included epidural hematoma after cervical or lumbar spine interventions (n=2), intra-peritoneal bleeding after psoas compartment block (n=2), and hematoma after peripheral nerve block (n=2). Of these, 2 cases were related to unnoticed continuation of anti-coagulation therapy.

In the cases of inadvertent intrathecal injections of local anesthetics (n=6), they resulted in death in all except 1 case. They occurred during cervical epidural block or facet joint block (n=3), prolotherapy at the cervical region (n=2), or trigger point injection at the shoulder (n=1).

Infection at the origin was also identified in 6 cases. These included bacterial meningitis, epidural abscess, or infectious spondylitis after cervical or lumbar spinal procedures (n=4), infectious spondylitis after prolotherapy in the back muscle (n=1), and infectious arthritis after intra-articular injection of the knee joint (n=1). In all except 1 case involving cervical procedures, all of these patients recovered without permanent injuries after medical or surgical treatments (Table 4).

Table 3
Comparison of characteristics of the invasive procedure-related cases between the first half (July 2009–June 2014) and second half (July 2014–June 2019) of the study period.

	2009–2014 (n=21)	2014–2019 (n=25)	P value
Sex (female/male)	11/10	19/6	.172
Age (yr)	55.1 ± 14.0	56.5 ± 14.4	.919
Type of practitioner:			
Anesthesiologists/non-anesthesiologists	18/3	9/16	.002*
Relationship of injuries with procedures:			
Directly/not directly related	16/5	22/3	.508
NAIC severity score	5.3 ± 2.8	5.3 ± 3.3	.988
Outcome:			
Temporary or non-disabling/permanently disabling/death	10/8/3	13/3/9	.069

Values are expressed as number of cases or mean ± standard deviation.

NAIC = National Association of Insurance Commissioners.

* Statistically significant at $P<.05$.

Table 4**Damaging events in the invasive procedure-related cases during the study period.**

	Damaging events
Spine (n=26)	
Cervical epidural/root/facet joint block	Pneumocephalus (1), intrathecal injection (3), intravascular injection (1), needle trauma to the nerve (1), epidural hematoma (1), meningitis (1)
Lumbosacral epidural or root block/neuroplasty/epiduroscopy	ICH (1), cerebral infarction (1), PDPH (1), meningitis (2), epidural abscess (1), epidural hematoma (1), intravascular injection (1), sensorimotor deficit of unclear cause (4), pre-existing condition (3), fall down (1)
SCS insertion	Surgical trauma (1)
Lumbar facet joint block	CRPS (1)
Head and neck (n=3)	
Stellate ganglion block	Overtreatment (1)
Prolotherapy	Intrathecal injection (2)
Upper extremities including shoulder (n=5)	
Intramuscular stimulation	Pneumothorax (1)
Trigger point injection	Intrathecal injection (1), pneumothorax (1)
Suprascapular nerve block	Intravascular injection (1), overtreatment (1)
Trunk (n=7)	
Prolotherapy	Infectious spondylitis (1)
Trigger point injection	Anaphylaxis (1), vasovagal reaction (1)
Intercostal nerve block	No improvement (2)
Psoas compartment block	Hemoperitoneum (1), renal hematoma (1)
Lower extremities (n=3)	
Femoral nerve block	Hematoma (1)
Sciatic nerve block	Hematoma (1)
Intra-articular injection	Infection (1)
Multiple sites (n=2)	
Nerve blocks for fibromyalgia	Suicide (1), overtreatment (1)

Values are expressed as number of cases.

CRPS=complex regional pain syndrome, ICH=intracranial hemorrhage, PDPH=postdural puncture headache, SCS=spinal cord stimulator.

4. Discussion

The practice of chronic pain management including pain interventions has markedly increased in recent years. Although uncommon, interventional pain procedures carry inherent risks of complications.^[1-3,8,9] According to a retrospective study of 26,061 spine interventions, the adverse event rate of these commonly performed procedures for chronic pain is 1.9%.^[9]

As complications trigger lawsuits, medical disputes related to chronic pain management have increased proportionally. This assumption is supported by our analyses showing an increasing trend of cases for chronic pain management relative to cases for surgical anesthesia (a linear increase: 2.9% [95% confidence interval: 0.5%–5.2%] per year). As a result, the proportion of cases for chronic pain management increased from 23.7% in the first half to 35.3% in the second half ($P=.025$).

Similarly, an increasing trend of claims for pain medicine was confirmed in a study of closed claims in the USA^[1] and a study that used a domestic medical malpractice liability insurance database.^[10]

4.1. Cervical procedures causing frequent and severe complications

Cervical procedures accounted for 23.9% (11/46) of all invasive procedure-related cases during the study period. Six of these cases resulted in death. Previous studies^[1,3,4,8] have similarly demonstrated increased risk for grave complications in cervical procedures and have suggested several anatomical risk factors, including proximity of the vertebral artery and spinal cord during procedures, an epidural space a few millimeters thick, and a discontinuous ligamentum flava, among others. In a study of

closed claims in the USA looking at the 3 most common procedures, cervical and lumbar injections accounted for 44% and 29% of claims, respectively.^[1] Considering the greater frequency of lumbar injections, cervical injections have a higher risk.

As the natural outcome of 90% of patients with cervical radicular pain is either near or complete resolution of symptoms,^[11] more conservative treatments may be needed in these patients than in patients with lumbosacral radiculopathy.

In this analysis, 2 cases of inadvertent intrathecal injection of local anesthetics occurred during prolotherapy in the neck. While 1 patient recovered with multiple rib fractures following cardiopulmonary resuscitation, the other patient died. In prolotherapy targeting deep structures at the neck, the risk for intrathecal injection is similar to other neuroaxial injection procedures.

If local anesthetics are inadvertently injected into the subarachnoid space during the procedure, the symptoms that develop will depend on the spinal segments involved. Therefore, inadvertent injection of local anesthetics occurs at the cervical level, it can lead to hypotension, bradycardia, loss of consciousness, and possible respiratory or cardiac arrest.

In our analyses, a fatal case of unintentional intrathecal injection was identified in the injection of a superficial trapezius trigger point. In this case, the patient was a 36-year-old woman with chronic neck pain, and trigger point injections were performed using a 23-gauge 1.5-inch needle connected to a 10 mL syringe and palpation technique. Five minutes after the injection, she experienced respiratory depression and subsequent cardiac arrest. An unintentional intrathecal injection is possible even in trigger point injection or stellate ganglion

block,^[12,13] practitioners should remember that the intent of conducting a superficial procedure is to absolutely avoid intrathecal injection, particularly when performing cervical or shoulder procedures. In addition, it is essential for practitioners to provide informed consent to the patient, prepare for airway events or seizures, and maintain a high level of vigilance during the procedure.

4.2. Characteristics of the CRPS-related cases

We found that the proportion of CRPS-associated cases increased over time and accounted for 46.9% of all cases of chronic pain management. This increase in CRPS-associated cases is probably due to increasing attention of the public regarding CRPS, rather than increasing overall prevalence of CRPS.

The majority of the cases (73.9% of the CRPS-related cases) were related to financial compensation claims involving private insurance companies or public institutions (e.g., National Workers' Compensation and Welfare Service or Ministry of Patriots' and Veterans' Affairs).

In South Korea, doctors of 5 clinical specialties (anesthesiology, orthopedics, rehabilitation medicine, neurology, and rheumatology) can only diagnose CRPS and determine its impairment ratings independently. All anesthesiologists and some clinicians of other clinical specialties have made a diagnosis of CRPS according to the Budapest criteria of the International Association for the Study of Pain. However, until 2020, the National Workers' Compensation Insurance Act and Patriots and Veterans Welfare Corporation Act have adopted the 5th edition of the American Medical Association guides (more strict criteria based on objective medical findings) as diagnostic criteria of CRPS. In addition to this inconsistency of diagnostic measures, difficult evaluation of impairment for CRPS and lack of definite treatment measures might also promote medical disputes. The other main reasons for these conflicts were that CRPS is not proportional to the severity of the injury resulting from inciting events, and is not necessarily limited to the distribution of the injured nerve.

The conventional impairment evaluation criteria of the American Medical Association focus more on objective findings than subjective symptoms, thereby leading to lower impairment grade in a CRPS patient.^[14] Recently, CRPS pain itself has been rated as a permanent impairment in South Korea based on judicial precedents. However, as many chronic patients engage in exaggeration or malingering in cases of litigation,^[15] detecting such cases remains a major issue to be resolved.

Our data showed male predominance (36 males, 10 females) in CRPS cases, which was inconsistent with general epidemiological findings.^[16,17] A German study of 1043 patients reported a disparity in the incidence of CRPS between women and men (71% and 29%, respectively).^[16] A Korean population study using the National Health Insurance Service data also confirmed female predominance of CRPS (54.9% in women vs 45.1% in men).^[17] This inconsistency may be due to the prevalence of cases related to workers' compensation or Patriots' and Veterans' benefits in our data.

Notably, in 10 cases, the causative injuries of CRPS were identified as iatrogenic. In 7 of 23 claims for CRPS in a previous domestic closed claims study, the physician was liable due to negligence.^[14] Therefore, care should be taken to avoid nerve damage in all medical practices, including pain interventions.

4.3. Characteristics of the cases involved with non-anesthesiologists

Overutilization of interventional techniques in chronic pain management can increase costs of care and avoidable patient harm, thereby increasing the risk of medical disputes.^[18] In South Korea, the introduction of private medical expense insurance (almost fully reimbursed for medical practices without rejection) prompted a huge increase in the involvement of a diverse group of practitioners in chronic pain management. These recent situations were confirmed by our analyses, in which the proportion of invasive procedure-related cases provided by non-anesthesiologists increased from 14.3% in the first half to 64.0% in the second half of the period analyzed ($P = .002$).

Notably, fatal cases were more common in cases involving non-anesthesiologists compared to cases involving anesthesiologists (57.9% vs 7.4%, respectively; $P < .001$).

Unlike anesthesiologists, other physicians have limited means of gaining competency in the specialty (i.e., deficiency of organized education and training programs in the academic society setting) in South Korea. Thus, they enter the field of interventional pain medicine with divergent knowledge and training in interventional techniques. In addition to these situations, variations in expertise in managing critical conditions might affect a higher fatality in cases involving non-anesthesiologists.

4.4. Sustained prevalence of infectious complications

In this analysis, there was a total of 6 cases of infectious complications, including 1 fatality. A recent malpractice claims study for outpatient interventional pain procedures in the USA reported that 13.5% of claims (17/126) were associated with infectious complications.^[13] However, a domestic study that used the data collected through the Korea Medical Association mutual aid and a private medical malpractice liability insurance company showed that the most common types of complications were related to infection, which accounted for 33.4% (112/335) of all dispute cases.^[9] The relatively high incidence of infectious complications in that study may have been related to the differences in data sources; unlike the present study, that study excluded cases of litigation from the analyses, thereby yielding a relatively large number of cases with mild infectious complications.

Most infectious complications may be preventable by strict adherence to aseptic techniques. However, in contrast to neuroaxial anesthesia or peripheral nerve block/catheterization for surgical patients, there are no evidence-based asepsis guidelines for single-shot peripheral pain injection/nerve block techniques in an office setting. In reality, there was a wide degree of variation in what was considered "essential" for aseptic pain techniques among practitioners.

For single-shot peripheral injection/nerve block in a pain clinic, generally accepted infection control measures (although borrowed from regional block in a surgical setting) include antiseptic skin preparation with alcohol or chlorhexidine, use of sterile gloves and sterile drape, decontamination of ultrasound transducer, and postprocedural surveillance for injection site infections.^[19,20] Of course, medications labeled as "single-use" should be used for only 1 patient.

4.5. Limitations of the KSA database analyses

As described in previous KSA reports,^[3,5] this type of study should be interpreted cautiously. First, our data tend to be biased

toward more severe and costly injuries. Because most of minor complications are resolved through settlement prior to police or court, such cases cannot be included in our database. Second, this analysis did not include data on the total number of adverse outcomes or the total number of pain procedures performed, making it impossible to provide a correct comparison of the safety levels of the specific pain practice between the first and second halves of the study period. In this regard, fewer cases of invasive procedures in the second half of the study period might be a mere reflection of an overall drop in invasive procedures performed or an increased settlement prior to legal disputes. However, this type of study allows a review of rare but often severe complications, helping to establish preventive measures for improving patient safety and reducing practitioner liability.

5. Conclusion

In conclusion, our contemporary analyses reveal several trends in the characteristics of medical dispute cases related to chronic pain management, including an increasing trend of cases for chronic pain management relative to surgical anesthesia-related cases, a higher severity of complications in cervical procedures, an increase in CRPS-associated cases, an increase and a higher fatality in cases involving non-anesthesiologists, and sustained prevalence of infectious complications.

To provide safer care and reduce the likelihood of litigation in chronic pain management, it is essential to practice evidence-based care with sufficient procedural skills and inform patients of the possibility of complications and worsening or no improvement in pain after the procedure.

Author contributions

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