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区域麻醉的进展

苗宁

区域麻醉是一较“古老”的麻醉方法，它是临床麻醉的重要组成部分。区域麻醉分为两类：一类是外周神经阻滞麻醉，另一类是椎管内麻醉，包括硬膜外麻醉和蛛网膜下腔麻醉。传统的外周神经阻滞麻醉使神经支配部位的痛觉消失或降低；椎管内麻醉则使相对应脊髓节段的感觉神经和运动神经冲动降低而达到手术和镇痛的效果。

19 世纪末和 20 世纪初在全身麻醉出现之前由外科医生率先使用区域麻醉进行手术以防患者手术伤害性刺激而至的“术中休克”。20 世纪椎管内麻醉的兴起和有效性进一步增加了区域技术的使用。

区域麻醉的优点毋庸置疑：术后器官功能恢复快速，镇痛效果良好，全身鸦片类药物的使用以及术后恶心，呕吐减少。但其副作用也不容忽视。少见但最严重的当属麻醉药导致的心脏和神经毒性，另外较常见的为外周神经、血管受损；血压降低等等。

1980 年代外周神经刺激器的临床应用使区域麻醉更安全和简便。近年由于可视超声技术（POCUS）的迅猛发展，推广和普及，超声引导下的区域麻醉减少了所需的局麻药剂量，减少了神经刺激器引起的患者不适并提高了围术期的安全性和有效率。

超声波对人体结构解剖部位的可视化，除了帮助麻醉医生精准区域麻醉，观察针尖部位和注射药量，并可在围术期实时用之诊断患者的可疑病变，尤其是在紧急状况下发现可能的急症并及时纠正之。

预计这些技术的长足发展以及将来更多、更好的医疗技术的出现会使区域麻醉更加普遍地在临床麻醉学和围术期运用。

Regional Anesthesia in Cardiac Surgery: Review of Literature

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Introduction

Cardiovascular disease is the leading cause of mortality worldwide, accounting for approximately one third of all deaths.¹ The aging population in the United States will undoubtedly lead to increased volume of cardiothoracic procedures.² Poorly controlled surgical pain is associated with development of chronic pain in 20-50% of the patients who are post sternotomy and thoracotomy.³⁻⁵ In the early 1990s, high-dose long-acting opiate anesthetic strategies were utilized to blunt the sympathetic response from surgical pain and promote hemodynamic stability.⁶ This resulted in patients requiring prolonged mechanical ventilation thus extending time spent in the intensive care unit (ICU). While opioid therapy is still the principal means of controlling pain following cardiac surgery, this practice changed over the past two decades with expectation towards “fast tracking” with earlier extubation, reduced lengths of stay, and earlier discharges. Likewise, the current sociopolitical efforts in battling the opioid epidemic have made multimodal analgesia in cardiothoracic surgery even more appealing. With increasing incorporation of ultrasound-guided regional anesthesia into the multimodal analgesia regimen and enhanced recovery after surgery (ERAS) protocols, it is not unusual to extubate immediately after surgery in the operating room.⁷

While it is possible to use neuraxial techniques in cardiac surgery, the hemodynamic instability and potential of spinal hematoma makes it controversial. Of note, the use of total spinal plus general anesthesia for cardiac surgery has been described in the literature without a single spinal hematoma.⁸ The chest wall blocks such as pectoralis fascial (PECS), serratus anterior plane (SAP), erector spinae (ESP), and paravertebral (PVB) blocks are becoming attractive options since they do not result in hemodynamic changes as seen with neuraxial blockade. Some disadvantages of the chest wall blocks are lack of effect to the internal mammary region, resulting in residual pain. The sternal blocks such as Parasternal intercostal nerve blocks (PSINB) and Thoracic transversus muscle plane block (TTMPB) have been described to help with that since it can reliably anesthetize the anterior branches of T2-T7 intercostal nerves.⁹

The purpose of this review article is to provide a general overview of the chest wall and sternal blocks, summarize and discuss the latest clinical data with each block and their clinical outcome.

PECS I and II Blocks

First described in 2011 and 2012, Pectoralis I (PECS I) and Pectoralis II (PECS II) blocks were used for breast surgeries to provide analgesia to the upper anterolateral chest wall.¹⁰⁻¹¹

Kumar et al¹² randomized 40 patients undergoing coronary artery bypass grafting (CABG) or valve surgeries via midline sternotomy to postop PECS block or no block. The PECS group was extubated significantly earlier ($p < 0.0001$). Pain scores at rest and with cough were also lower in PECS group at 0, 3, 6, 12, and 18 hours after extubation ($p < 0.05$). Additionally, peak inspiratory flow rates assessed by incentive spirometry were higher in PECS group. Yalamuri et al¹³ also described a case report using PECS block as rescue analgesia in a patient undergoing mitral valve repair via right anterior thoracotomy approach. The block provided near-complete chest wall analgesia using 30ml of 0.20% ropivacaine with 1:400,000 epinephrine.

Furthermore, in a study by Marcoe et al,¹⁴ 112 patients receiving multimodal analgesia with either PECS 1 block, subcostal TAP (TAPPEC), or multimodal analgesia without any regional block were compared. The groups receiving the regional blocks required 51.1% less opioids intraoperatively ($p < 0.001$) and 46.9% less overall ($p < 0.001$). However postoperative opioid consumption and length of stay were not found to be statistically significant.

PECS blocks are considered very safe due to lack of major neurovascular bundles surrounding the area of interest.¹⁵ With ultrasound guidance, this block has a short learning curve. Since this block is performed in supine position, it has great potential as post op analgesic option for cardiac surgeries.

Serratus Anterior Plane Block

Serratus anterior plane (SAP) block was first described in 2013 to block thoracic intercostal nerves to provide analgesia to the lateral cutaneous branches of the intercostal nerves from T3 to T9.¹⁶ SAP is an extension of PECS II block with injection that is more inferolateral and a wider spread. However, this block spares the mid chest.¹⁶ Some studies suggest that volumes greater than 40ml are needed to achieve a spread that covers T1-T8.¹⁷

While the SAP block has been extensively described for thoracotomies, currently there are no studies on the use of SAP block for sternotomy. However, a few studies did demonstrate its utility in cardiac device implantation procedures. De Waroux et al¹⁸ found that single-shot SAP block allowed anesthesiologists to avoid general anesthesia and perioperative opioid use for cardiac defibrillator implantation. Droghetti et al¹⁹ produced the same result, except for one patient that required conversion to GA due to anxiety. Magoon et al²⁰ randomized 100 adults undergoing cardiac surgery via thoracotomy approach to SAP, PECS II, or intercostal nerve block groups. They found that early pain scores were similar among all three groups, but late mean pain scores were significantly lower in SAP and PECS II groups ($p < 0.05$). The amount of rescue fentanyl required was significantly higher in the intercostal group compared to SAP and PECS II ($p < 0.001$).

Possible complications with SAP block include infection, pneumothorax, and local anesthetic toxicity due to higher required volume of injection. However, SAP block is considered very safe to use in cardiothoracic procedures because the complications are exceedingly rare with the use of ultrasound guidance.

Erector Spinae Plane Block

The erector Spinae Plane (ESP) block has been described for its utility for thoracotomy and surgeries involving the chest and abdomen.²¹⁻²⁴ The benefit of the ESP block over the fascial plane blocks described above is that it has the ability spread into ventral rami that covers T2 to T6 intercostal nerves based on cadaveric MRI assessments, which is helpful for median sternotomy.²⁵ This block is often referred to as “paravertebral by proxy” colloquially.²⁶

Krishna et al²⁷ randomized 160 patients undergoing elective cardiac surgery requiring cardiopulmonary bypass (CPB) into ESP or acetaminophen and tramadol group. The ESP group had significantly lower pain score ($p = 0.0001$) and patients experienced significantly higher duration of analgesia ($p = 0.0001$). Nagaraja et al²⁸ randomized 50 patients undergoing cardiac surgery into bilateral continuous ESP and thoracic epidural groups. Both interventions were performed 1 day prior to surgery. The authors found that the duration of mechanical ventilation, incentive spirometry, and ICU stays were comparable. Even though pain scores were significantly different, mean scores for both groups were $< 4/10$. Because the vast majority of patients undergoing cardiac surgery are anticoagulated, thoracic epidural is a less attractive option. Results comparing ESP to thoracic epidural head-to-head makes ESP a very attractive alternative.

Although there are theoretical risks with all blocks such as infection, hematoma, and LAST, there have not been any reported complications with ESP blocks. While there are no established guidelines, experts believe that this block should be considered superficial, and compressible in case of a hematoma.²⁸

For anticoagulated patients, the risk of neurological deficits from paraxial blocks is extremely low, especially compared to neuraxial blockade. While the current data on ESP is very promising, this block is still very new and more studies are needed to delineate its true effectiveness in cardiac surgeries.

Conclusion

As we move towards ERAS and stride towards opiate free anesthesia, the world of cardiac surgery is lagging behind. Regional techniques provide significant analgesia as part of the multimodal pain management regimen. While the regional techniques mentioned above are more established outside of the cardiac realm, the available data suggest they have tremendous potential in various types of cardiac surgeries. Since the sample sizes are mostly very small, we still need studies conducted on larger proportions to not only verify the validity of the current data, but to also establish the safety profiles and delineate mechanisms of the newer regional techniques.

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Retrospective study evaluating the post-operative course of fast-track spinals vs. traditional spinals in primary total hip arthroplasty#

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Abstract

Purpose: Fast track hip arthroplasty protocols have been developed to facilitate patient recovery and have become more commonplace. The purpose of this study was to evaluate whether the type of spinal anesthetic administered in a fast-track hip arthroplasty protocol impacted patient safety, readmission and length of stay.

Patients and Methods

All patients undergoing primary total hip arthroplasty in the past 3 years between January 1, 2010 and January 30, 2013 at our institution were retrieved from the anesthesia electronic record (Metavision). Patients who met the following inclusion criteria were included: those who received a spinal anesthetic and complete Metavision record. Fast-track spinals (FTS) were defined as spinal anesthetics containing lidocaine +/- epinephrine or bupivacaine alone. Traditional spinals (TS) were defined as spinal anesthetics containing all other combinations of local anesthetic such as bupivacaine with epinephrine and tetracaine +/- epinephrine.

Results

A total of 606 patients were included in the study, with 303 patients in the FTS group and TS group, respectively. The average LOS in the FTS was 1.5 day. The average LOS in the TS was 2.1 days (P value < 0.001). Of note, nine patients in FTS group were discharged on the same day as their surgery without any post op complications or readmission. Similar to previous data, LOS was still found to be significantly different when adjusted for covariates of age and BMI. No statistical significance was seen in the rate of conversion to general anesthesia or in readmission to the hospital for any cause. There is no difference in satisfaction, readmission or complications between two groups at one-year follow-up visit.



Conclusion

Fast-track protocols use regional anesthesia to provide multi-modal analgesia in order to expedite a patient's recovery and discharge. Limited research has performed on the effect of an anesthesiologist's choice of local anesthetic drug and adjuncts on a patient's hospitalization beyond the perioperative setting. Our research suggests that the choice of local anesthetic drug has a significant impact on not only a patient's perioperative analgesia but also on the patient's total length of stay (LOS). The fast-track Spinal (FTS) patients appear to be more satisfied in early postop follow-up at 6-8 weeks compared to the Traditional Spinals (TS) patients. No difference in patient satisfaction, readmissions or complications was noted in two groups at one-year follow-up visit.

Introduction

Healthcare costs continue to rise across the US. Over the past decade, we have seen our health care costs increase at an alarming rate. As of 2010, the U.S. has spent 2593.6 billion dollars on healthcare, which is up from 1377.2 billion in 2000. As staggering as this number may seem, the more troubling statistic is that the percentage of our healthcare costs in relation to our country's GDP has steadily increased from 13.8 to 17.9% over the same period.¹ In comparison to other developed countries, the U.S. spends approximately 1.5 times as much as other countries on healthcare while providing similar and possibly lower quality care with increased mortality in comparison with other countries.²⁻³ These costs represent a large burden for our patients and society in general and are projected to increase.

In 2010, the average cost of total hip arthroplasty (THA) in the U.S. was approximately \$17406, which was almost \$2000 more than a hip arthroplasty in Australia, which had the next highest cost for THA¹. In an effort to increase efficiency, many institutions across the world have instituted a "fast-track" protocol for THA. These protocols focused on improving patient satisfaction and early mobilization, while decreasing the incidence of organ dysfunction and the length of stay (LOS).⁴ One of the first major changes involved changing the anesthetic technique from general anesthesia to regional anesthesia. Initial research showed spinal anesthesia to decrease the (LOS) and to be non-inferior to general anesthesia.⁵ Other noted associations were decreases on intraoperative blood loss, post-operative incidence of pneumonia, and incidence of deep vein thrombosis (DVT).⁶ Further research showed continued non-inferiority of spinal anesthesia versus general anesthesia but statistically significant differences in the incidence of DVT became less apparent.⁷ Refinement of fast-track protocols has led to decreased LOS to between 2 and 3 days without a significant increase in re-admission rate.^{4,8-9} This dramatic reduction in LOS with improved outcomes suggests a large cost savings for patients, hospitals and society in general. In light of these data, our department in collaboration with the Department of Orthopedic Surgery instituted a fast track hip protocol at our institution based on previously established protocols at other institutions.

The fast track hip protocol at our institution is similar to other institutions' fast track protocols. One area of particular interest upon review of the other institutions' protocols was the differences in type of spinal anesthetics used: plain bupivacaine, bupivacaine with or without other adjuncts such as opioids and/or vasopressors.^{4,10} Current literature suggests that the choice of local anesthetic, spinal adjuncts such as morphine or epinephrine can significantly alter the duration of action of spinal anesthesia.¹¹⁻¹⁴ It was unclear from other institutions' protocols and studies if there was an optimal local anesthetic drug and/or adjuncts to use in spinal anesthesia.

It was also unclear as to whether the choice of spinal anesthetic provided a significant impact on a patient's LOS after hip arthroplasty especially since the average length of stay was reported as between 2-4 days and all spinal anesthesia resolved within hours of intrathecal administration.

Given this background information, when the fast track hip protocol was first implemented at our institution, our anesthesiologists used primarily local anesthetic with epinephrine (vasopressor adjunct) to ensure adequate spinal anesthetic duration. However, it was quickly noted by the surgical/physical therapy team, that patients were unable to participate in the protocol mandated physical therapy on post-operative day 0. Upon receiving feedback from the surgical services, our anesthesiologists implemented a fast track 'spinal' protocol which eliminated epinephrine from intermediate duration local anesthetics for hip replacements. Since implementation of the fast track spinal protocol, patients have been able to participate in physical therapy successfully on post-operative day 0. In fact, a few patients were discharged on day of surgery.

The aim of our retrospective study was to evaluate the efficacy and safety of shorter duration spinal anesthetics in comparison with longer duration spinal anesthetics in our fast-track hip arthroplasty protocol in terms of LOS and rate of readmission.

Materials and Methods

A fast-track total hip arthroplasty protocol was implemented at Barnes-Jewish Hospital/Washington University School of Medicine in St. Louis in 2010. This protocol contained three components: preoperative, intraoperative, and postoperative patient care. The preoperative component included a pre-operative anesthesia assessment, Celebrex 200mg, PO, Hydrocodone with Acetaminophen 10mg/650mg, PO and Tramadol 50mg, PO, spinal anesthetic, intravenous antibiotic administration and Foley catheter placement. The intraoperative component included intravenous sedation, intravenous tranexamic acid and sequential compression devices to calves. The postoperative component consisted of discharging patients home with home physical therapy once pre-defined discharge criteria were met. Of note, the home physical therapy and pre-defined discharge criteria applied to all patients whether they were in the fast track hip protocol or not.

Preoperative spinal anesthetic technique, intraoperative medication choices, and all fluid management were at the discretion of the anesthesia providers. All spinal anesthesia with the exception of first start cases were performed in the preoperative holding area. This was done solely to expedite operating room efficiency. All spinal anesthetics were initiated in the lumbar spinal region. Fast-track spinals (FTS) were defined as spinal anesthetics containing only bupivacaine plain or lidocaine with or without epinephrine. Most commonly, 15mg of isobaric/hyperbaric bupivacaine or 70mg lidocaine with 200mcg epinephrine were used. Traditional spinals (TS) were defined as any spinal anesthetic containing a combination of local anesthetics, vasoactives and/or opioids not specified as FTS. TS include tetracaine plain spinals. For simplicity and given the low incidence of usage of tetracaine and other local anesthetic, opioid, vasoactive combinations at our institution, this study only evaluated patients who received TS containing bupivacaine with epinephrine. The most common dose was 15mg bupivacaine with 200mcg epinephrine.

Length of stay (LOS) was defined as post-operative nights spent in the hospital until discharge. Pre-defined discharge criteria included: participation in two post-operative physical

therapy sessions and one occupational therapy session, and the ability to ambulate fifty feet, dress, bathe, and perform activities of daily living. Hospital based physical therapy was initiated as soon as patients were able to participate. Due to restricted availability of physical therapists, few, if any non-fast track hip protocol patients received their first physical therapy session post-operative day zero. In contrast, all fast track hip protocol patients received mandatory physical therapy post-operative day zero as long as their spinal anesthetic had resolved. Once any patient met discharge criteria, they were discharged to home with home physical therapy per protocol.

The following parameters were measured: age, ASA status, BMI, history of coronary disease, history of chronic obstructive pulmonary disease, history of asthma, history of diabetes mellitus, day of the week of surgery, hour of the day at which time spinal was administered, LOS, readmission at 30 days, and conversion to general inhaled anesthesia

All parameters were extracted from the anesthesia electronic record (Metavision) with the exception of the patient's length of stay and any readmission in the first 30 days. This data was extracted from the hospital's electronic medical record repository Clindex.

A total of 1420 patients were identified in Metavision as having undergone hip arthroplasty or hip hemiarthroplasty between January 1, 2010-January 30, 2013 at our institution. The majority of these patients were undergoing elective primary hip arthroplasty, however a few patients were undergoing hip arthroplasty after a recent hip fracture. Patients were divided into their respective groups FTS and TS. Each Metavision chart was queried for completeness of preoperative assessment and intraoperative record. Any patient record with questionable completeness was excluded. Patients who received unclear spinal anesthetic medications were excluded (e.g. bupivacaine administration as "IV" or "Regional" given there is a "Spinal (SA)" option, epinephrine administered via spinal but no local anesthetic administered via spinal documented, spinal anesthesia procedure note but no spinal drug administered at or near time of spinal procedure). Any record with spinal opioids, mixed spinal local anesthetic administration, a change in procedure to non-hip arthroplasty (e.g. antibiotic spacer placement), or tetracaine spinal anesthetic was removed to simplify data analysis. See Figure 3 for the breakdown in patient groups.

A total of 439 patients met FTS criteria and a total of 361 patients met TS criteria. 303 patients from each group were randomly selected for analysis. It was felt that this sample size should provide adequate power to show statistical significance should there be a difference in LOS between the two groups.

Statistics

All statistical analyses were performed using SAS 9.3 (Chapel Hill, NC). Crude mean age, BMI and length of stay in days (log scale) were compared using Student's T-test. Proportions of subjects with history of CAD, diabetes, asthma, COPD and spinal vasopressor were compared using Fisher's exact probability test. A finite mixture model (distribution as a weighted sum of component distribution, FMM procedure) was used to address over-dispersion of count data and to model zero counts from non-zero counts. Hurdle, Poisson regression, zero-inflated Poisson regression and zero-inflated negative binomial (ZIPB) models were assessed using Pearson statistic to evaluate best control of over-dispersion. Results from ZIPB final model correcting for age were reported in this analysis. SAS UNIVARIATE, NLMIXED and SGPLOT procedures were used to depict figures. P-value of <0.05 was flagged as significant.

Results

A total of 606 patients were included in the study. There were statistically significant differences between the groups in the evaluated patient characteristics (see Table 1 for details). In particular, there was a significant difference in age, BMI, and incidence of chronic obstructive pulmonary disease. Both groups were compared in terms of LOS, conversion to general and rate of readmission to the hospital. The average LOS in the FTS was 1.5 day. The average LOS in the TS was 2.1 days. P value was < 0.001 . See Figure 1 for complete breakdown of patients' LOS. Of note, 9 out of 303 (3%) patients in FTS group were discharged on the same day as their surgery without any post op complications or readmission. There was one mortality in the traditional spinal group. Similar to previous data, LOS was still found to be significantly different when adjusted for covariates of age and BMI as seen in Figure 2 and Table 2. No statistical significance was seen in the rate of conversion to general anesthesia or in readmission to the hospital for any cause.

Conclusion

Fast-track protocols use regional anesthesia to provide multi-modal analgesia in order to expedite a patient's recovery and discharge. As seen in other studies and reaffirmed in our study, fast-track protocols decrease the LOS without increasing adverse outcomes that result in readmission to the hospital. Interestingly, our data suggested that choosing a local anesthetic without vasoactive adjuncts in a patient's spinal anesthetic was associated with decreased LOS. This data coupled with the anecdotal inability to participate in physical therapy secondary to prolonged spinal anesthetic duration after TS imply that the choices that anesthesiologist make in the perioperative setting have more impact than previously thought on a patient's hospital course.

Discussion

There are several potential pitfalls with this study. First, this is a retrospective cohort trial and not a prospective randomized control trial and thus subject to intrinsic bias. Furthermore, the differences in LOS may be explained by other external factors such as the patient's insurance status, floor nursing care, the availability and quality of physical therapy. All of our patients had insurance and home physical therapy readily available to them upon discharge. This does not confound our data; however, it may yield different results in LOS at other institutions where the population, which may or may not be 100% insured.

A more significant factor may be if a nurse or physical therapist knew a patient received a FTS versus TS. He/she may preferentially work with FTS patients first and then working with TS patients once all FTS patients have been evaluated and treated. This confounder could be further magnified by the fact that physical therapy is routinely available only twice a day. A FTS patient may be selected to go to physical therapy first causing a non-FTS patient whose spinal block has resolved to wait until an additional half a day to start physical therapy. This could potentially delay discharge by as much as 24 hours. This is particularly true at our institution, because of our history of patients in the fast track hip protocol who were unable to participate in physical therapy after TS. Similarly important, fast track hip protocol patients received a FTS and mandatory physical therapy post-operative day 0 while all non-fast track hip protocol patients whether they received a FTS or TS rarely received physical therapy post-operative day 0. Thus, while the choices an anesthesiologist makes in the peri-operative setting seem to have significance in affecting a patient's length of stay after surgery, the post-operative management

of a patient as suggested by other studies is likely equal if not more important in determining length of stay.

Surgeons believe the fast-track Spinal (FTS) patients had at least the same satisfaction as the traditional-spinal (TS) patients, if not more satisfied in early postop follow-up at 6-8 weeks. However, there is no group difference at one-year follow-up visit from the Hip Score Questionnaire objective data.

Table 1. Data distribution and sample characteristics comparisons

	Traditional	Fast track	P-value
Number	303	303	
Age (years)	59.4 (\pm 0.8)	56.9 (\pm 0.8)	0.03
BMI (kg/m²)	30.6 (\pm 0.4)	28.8 (\pm 0.3)	0.0003
Length of stay (days)*	2.09 (\pm 0.07, 2, 1-9)	1.53 (\pm 0.05, 1, 0-7)	3×10^{-13}
History of CAD			
Yes	22	20	0.87
No	281	283	
History of diabetes			
Yes	47	38	0.35
No	256	265	
History of asthma			
Yes	33	36	0.80
No	270	267	
History of COPD			
Yes	18	5	0.009
No	285	298	
Spinal vasopressor			
Epinephrine	303	129	2×10^{-68}
None	0	174	
Readmission			
Yes	5	5	1.00
No	298	298	
Conversion to GA			
Yes	9	16	0.22
No	294	287	

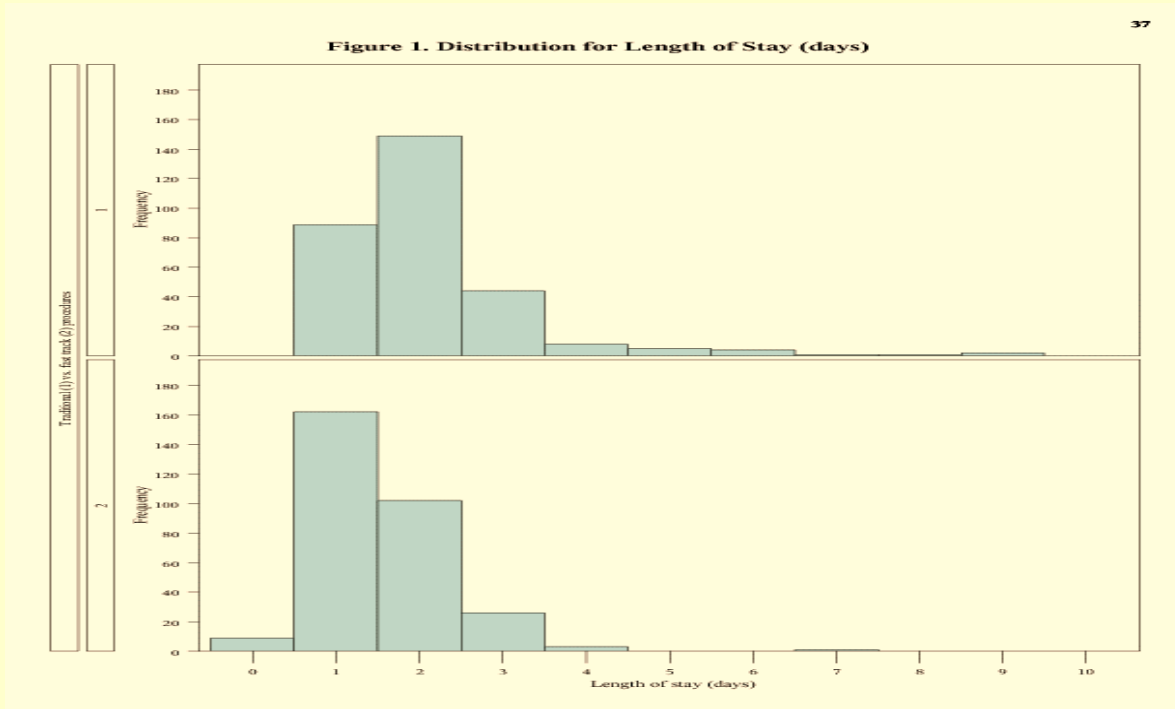
*: Mean (\pm standard error, median, range) of length of stay (LOS) in days.

Table 2. Regression analysis results for length of stay

Model*	Beta	SE	P-value
Model 1			
Intercept	0.5377	0.05036	1.3e-26
Length of stay (days)	-0.5486 [#]	0.08803	4.6e-10
Model 2			
Intercept	-0.7958	0.3230	0.014
Age (years)	0.02473	0.003125	2.5e-15
BMI (kg/m²)	-0.00669	0.006992	0.34
Length of stay (days)	-0.5088	0.08850	9.0e-9
Model 3			
Intercept	-1.0446	0.2067	4.3e-7
Age	0.02542	0.003086	1.8e-16
Length of stay (days)	-0.4979	0.08791	1.5e-8
Model 4 (final)			
Intercept	-0.08698	0.1428	0.54
Age (years)	0.01359	0.002218	9.0e-10
Length of stay (days)	-0.2808 [#]	0.06134	4.7e-6

*: Model 1, model 2 and model 3 applied homogeneous regression mixture in the FMM procedure for truncated Poisson distribution using no covariates (model 1), age and BMI as covariates (model 2) and age as a covariate (model 3). Model 4 used zero-inflated negative binomial (ZIPB) regression. Actually similar beta and SE estimates were found from Poisson, zero-inflated Poisson and ZIPB models. Pearson statistic was 287.6 from these three models relative to 553.3 from Hurdle model, indicating these three models including ZIPB performed better in controlling over-dispersion of the data. #: In model 1, without correction for covariates, the log count of stay for patients who used fast track procedure while in the hospital was 0.5486 (i.e., 1.73 days) less than those of patients who used traditional procedure. In model 4, after correcting for the effect of age, the log count of stay for patients who used fast track procedure while in the hospital was 0.2808 (i.e., 1.32 days) less than those of patients who used traditional procedure.

Age (older age), BMI and history of COPD are significantly associated with increased length of stay (LOS) whereas fast-track is significantly associated with reduced length of stay (LOS); After correcting for the effects of age, BMI and history of COPD, significant association between fast-track and reduced length of stay (LOS) remains; in other words, the detected significant association between fast-track and reduced length of stay (LOS) is independent of the effects of age, BMI and history of COPD.



“1” indicating Traditional Spinals (TS); “2” indicating Fast-Track Spinals (FTS).

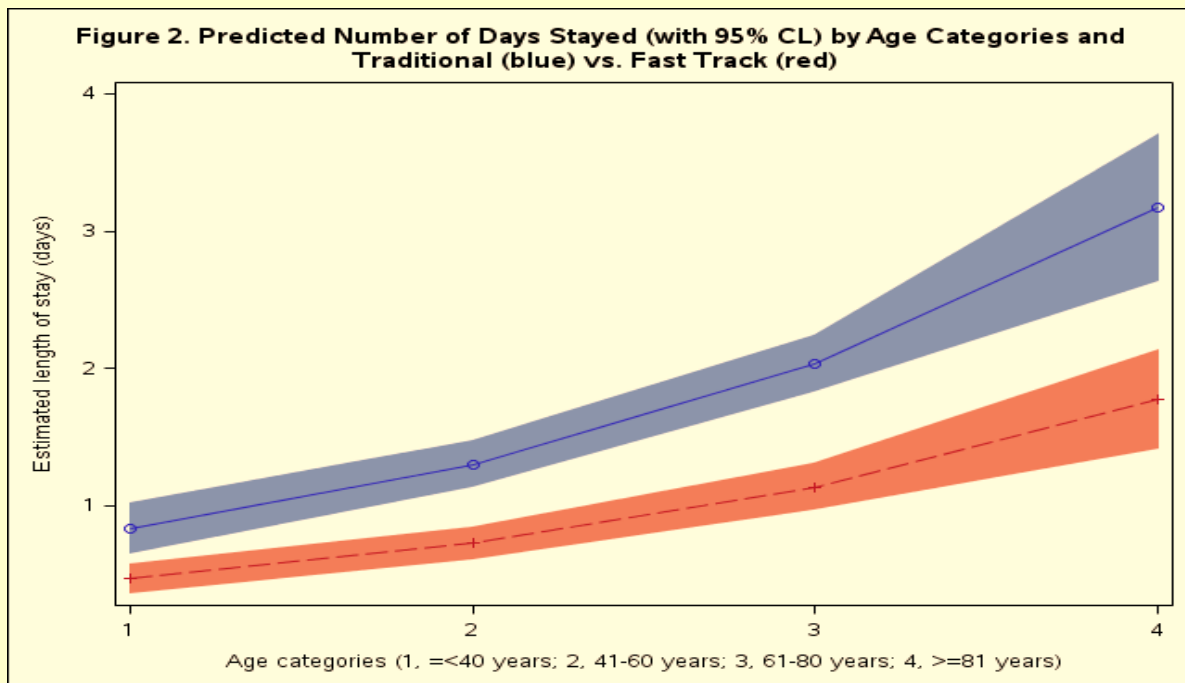
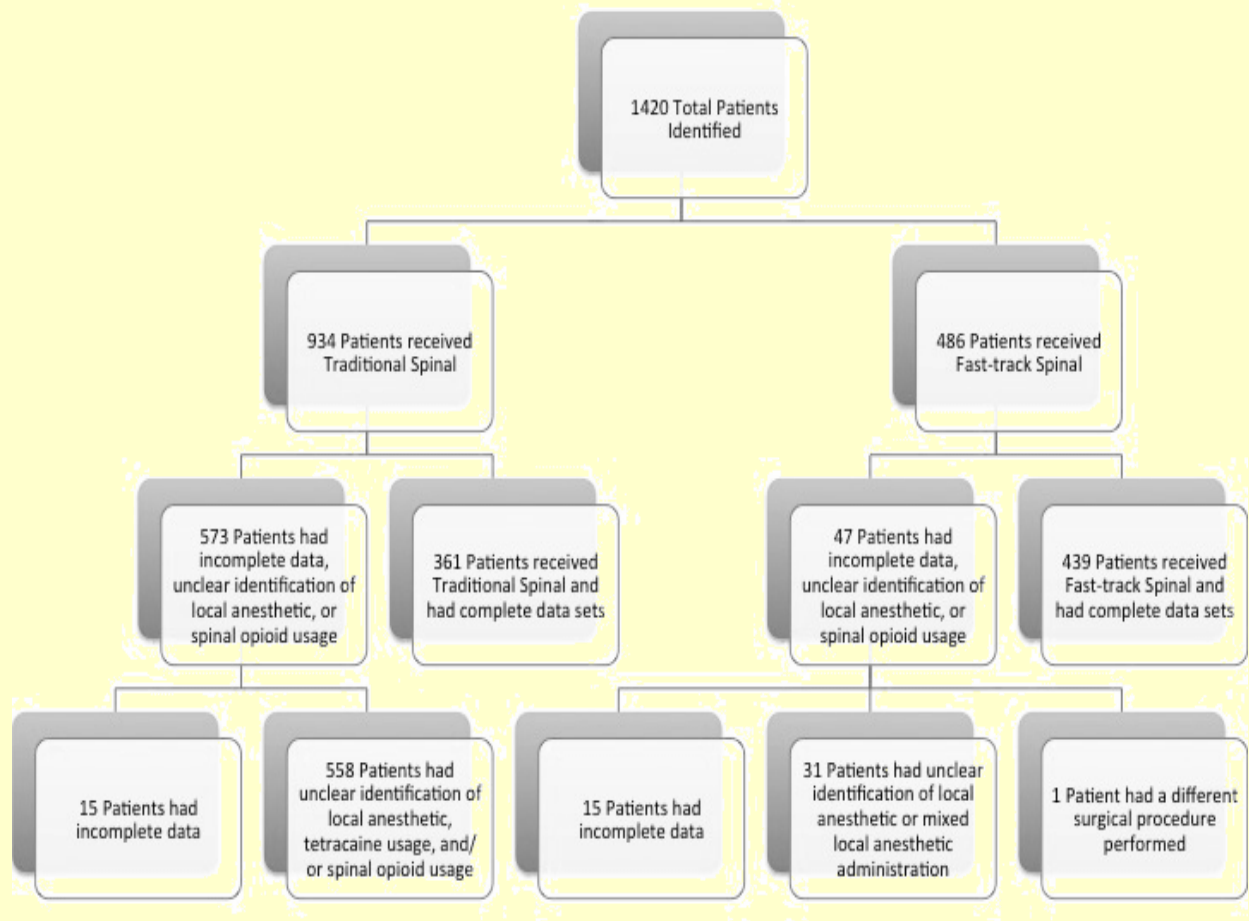


Figure 3



Acknowledgements

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Competing Interests

All authors declare no competing interests.

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瞳瞳太阳如火色，上行千里下一刻。唐 白居易

摄影：林永健 教授

CASA 麻醉医生群

Ultrasound-guided subcostal quadratus lumborum block for visceral pain in a case of retroperitoneal laparoscopic unilateral urinary tract resection

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Introduction

Retroperitoneal laparoscopic renal surgery has the advantages of small incision and less stress response. It has gradually replaced some traditionally opened renal surgery. However, the exploration of perianal area and resection of the renal lesion can cause obvious visceral pain. Visceral pain occurs slowly and lasts for a long time.¹ It is mainly manifested in slow pain, which often increases gradually, but sometimes it can quickly turn into severe pain, especially after operation.² Visceral pain can easily cause unpleasant emotional reactions, accompanied by nausea, vomiting and changes in cardiopulmonary systems. In addition, due to unique operation position and certain pneumoperitoneum pressure, targeted perioperative analgesia, especially for visceral pain, is needed to accelerate the recovery of patients and improve the prognosis of patients. Interestingly, quadratus lumborum block (QLB) is a new trunk nerve block technique.³ There are many different approaches for drug administration, and the sensory block plane is inconsistent. Anterior subcostal QLB is a new QLB technology based on the improvement of upper abdominal surgery analgesia.⁴ Theoretically, the diffusion plane of local anesthetics is higher, duration is longer, and most importantly, it may spread to the paravertebral space, making its more obvious effect for visceral pain.



Case report

An otherwise healthy 72 year old male with left renal pelvis tumor, had an extracorporeal lithotripsy for left kidney at another hospital about one year prior to his presentation at our institution. He also had grade 3 hypertension, pre-excitation syndrome and respiratory diseases. Pre op examination: there was no swelling, tenderness and percussion pain in both renal areas. Auxiliary examination: renal enhanced CT showed multiple stones in the left kidney and space occupying lesions in the left renal pelvis; Urine cytology showed that there were severe nuclear heterogeneous cells in urinary tract epithelial cells. He was referred to Chifeng Municipal Hospital for further evaluation and possible surgical intervention. His preoperative labs including CBC, chemistry panel, liver function tests, coagulations and prostate specific markers were all

within normal range. After preoperative preparation, he was wheeled into the operating room for retroperitoneal laparoscopic left urinary tract resection under general anesthesia.

Anesthesia course:

Anesthesia induction: midazolam 0.05 mg / kg, sufentanil 0.03 ug / kg, propofol 3 mg / kg and rocuronium 1 mg / kg. After endotracheal intubation, patient was placed on mechanical ventilator, the tidal volume was 6 ml / kg, the respiratory rate was 8 ~ 12 times / min, and the end expiratory carbon dioxide partial pressure was maintained at 35 ~ 45 mmHg; Anesthesia was maintained by 1% sevoflurane inhalation combined with propofol 2 ~ 4 mg · kg⁻¹ · h⁻¹ and remifentanil 0.1 ~ 0.2 μ G · kg⁻¹ · min⁻¹ infused intravenously, BIS was maintained at 40 ~ 60, and rocuronium was given regularly during operation.

Ultrasound-guided subcostal QLB:

Ultrasonic equipment and parameter settings: sonosite edge, low frequency convex array C60, MSK mode and Gen frequency. Peripheral plexus stimulation needle (0.71) was selected × 120 mm: Guoqi injection 20153212282; B. Braun Melsungen Ag), local anesthetic configuration and dosage: 0.33% ropivacaine (100 mg / 10 ml: h20140763; AstraZeneca AB) 30 ml. Nerve block before anesthesia induction: the QLB group improved the ultrasound-guided anterior subcostal QLB technique, according to previous study.⁴ The patient lay in the lateral decubitus position, the long axis of the ultrasound probe was first placed longitudinally in the subcostal ridge of the affected side, and then probe moved obliquely inward and downward on the 2 ~ 5 cm median long axis under the T12 rib and outside the L1 transverse process. The acoustic shadow of the T12 rib on the head side can be displayed on the sagittal section. The acoustic shadow of L2 transverse process on the caudal side shows not only the tissue structures of latissimus dorsi, erector spinalis, psoas quadratus and kidney from top to bottom, but also the two important anatomical structures of thoracolumbar fascia (TLF) and psoas major below psoas quadratus; the in-plane technique was used to puncture the head side. The puncture point was infiltrated and anesthetized with 1% lidocaine. At the level of L1 transverse process, the needle tip reached between psoas quadratus muscle and psoas major muscle (at the anterior layer of lumbar fascia). After there was no blood and gas, the local anesthetic was injected.

Postoperative analgesia:

The patient-controlled intravenous analgesia (PCIA) was switched on at the end of the operation for 48 hours. PCIA dispensing and parameters: oxycodone (10 mg / 1ml: h20130314; hamol Limited) 50mg + 0.9% normal saline to 100ml, oxycodone 0.5mg/ml, no-load dose and background infusion volume, single self-control dose 2ml, locking time 5min, limit dose 12ml / 6mg / h. The same person in the acute pain management team is responsible for the perioperative PCIA education and instructions. When the postoperative numerical rating scale (NRS) > 4 points, oxycodone 1 mg was injected intravenously for remedial treatment, and repeated administration if necessary until the NRS score ≤ 4 points.

Analgesic evaluation:

The abdominal somatic pain and visceral pain were evaluated by resting NRS score (r-NRS) and exercise NRS score (m-NRS) at 2 h, 6 h, 12 h, 24 h, 36 h and 48 h after the surgery, respectively (Fig 1).

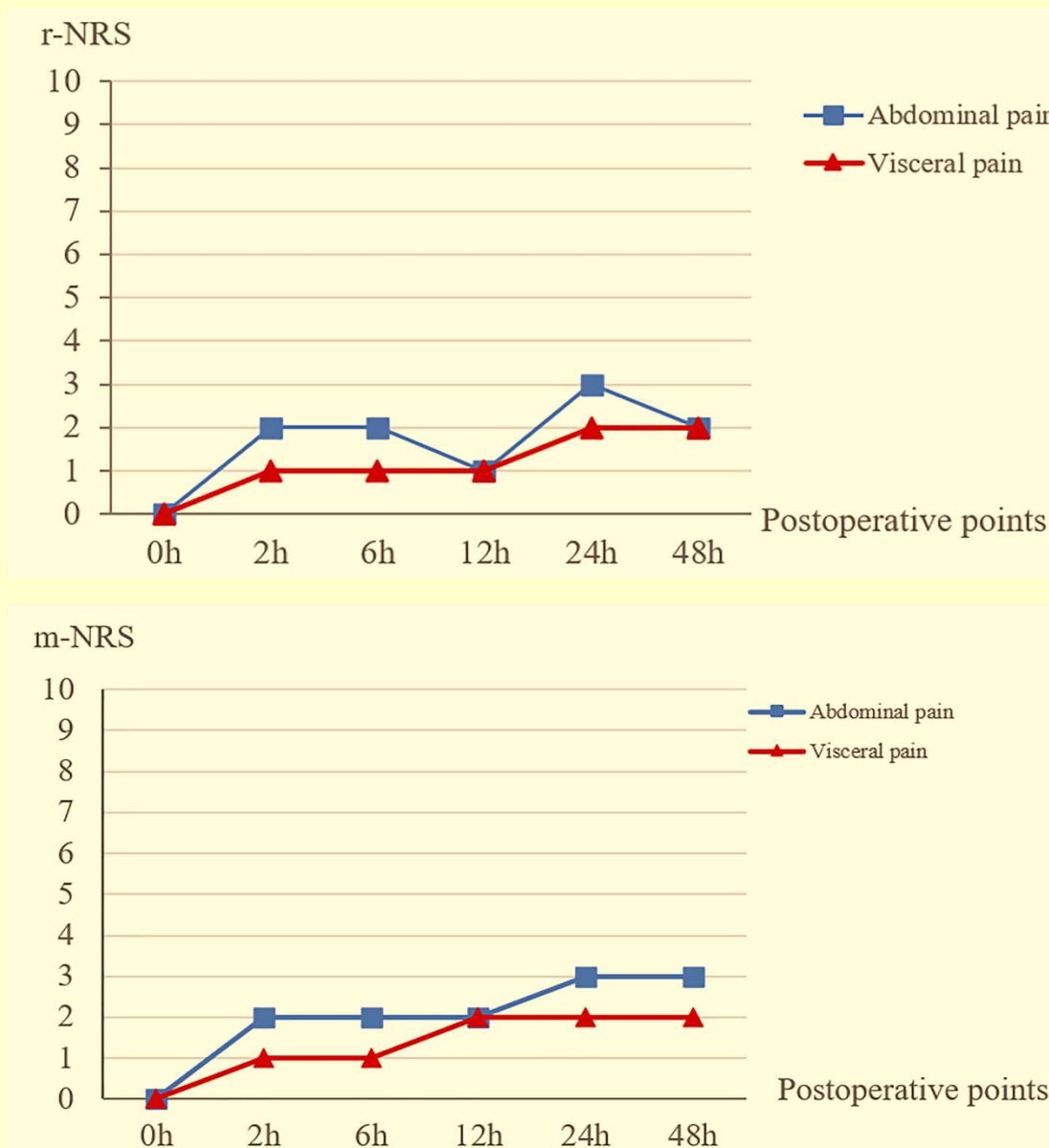


Fig 1. A. Evaluation of r-NRS within 48 hours after the surgery. B. Evaluation of m-NRS within 48 hours after the surgery.

Discussion

Retroperitoneal laparoscopic renal surgery has small incision trauma and no obvious body pain, but the patient has obvious visceral pain due to pneumoperitoneum, gastrointestinal tract traction, pathological tissue exploration and resection. Studies have shown that visceral pain is an independent risk factor for postoperative chronic pain, and the incidence of chronic pain in urological surgery can reach 30%.⁵ QLB was initially considered as a different form of transverse abdominal plane block, due to the fact the anterior QLB local anesthetic can spread to T10 paravertebral space and L1 ~ L3 nerves, blocking visceral pain and providing effective analgesic effect for lower abdominal surgery.⁶⁻⁷ Previous study confirmed that the subcostal anterior QLB local anesthesia will spread to the thoracic paravertebral space,⁴ the sensory block plane is

between T6 ~ T7 and L1 ~ L2, which is significantly higher than the T10 ~ L2 block plane of the anterior QLB, and the duration is longer, which may have more advantages in upper abdominal surgery. However, the mechanism of how QLB works is still unclear. It is generally believed that TLF is an important anatomical basis for the diffusion of local anesthetics to the paravertebral space to produce thoracic paravertebral block (TPVB).⁸⁻⁹ Based on the perioperative analgesic needed for upper abdominal surgery, we think that anterior subcostal QLB may have the analgesic effect on visceral pain.

In the study, the analgesic effects of anterior subcostal QLB were excellent. The amount of PCA, total compression times and effective compression times were reduced within 48 hours and motion pain was low at different time points within 12 ~ 48 hours after the surgery. These suggest that the effective time of QLB may reach 24 ~ 48 hours. Generally speaking, the type, volume and concentration of local anesthetics are the main factors affecting the onset time, duration and analgesic effect of the nerve block. Relevant clinical studies have shown that the duration of QLB can reach more than 24 h.³ Although the types, volume and concentration of local anesthetics are different in different studies, this may be related to the TLF limiting the diffusion of local anesthetics to the anterior and lateral side of psoas muscle.^{4,9} A study conducted a randomized controlled study to compare the effects of trans muscular QLB and TPVB on postoperative analgesia after laparoscopic kidney surgery, in order to provide clinical basis for the analgesic mechanism of intramuscular QLB, but the main results have not been published. The main results of this study confirmed the effectiveness of subcostal anterior QLB, and the duration of are better than TPVB.¹⁰ Due to the long duration of the effect of anterior subcostal QLB, the remedial analgesic treatment was reduced, which may reduce the incidence of nausea and vomiting and sedation caused by oxycodone, and improve the patient satisfaction. However, QLB also has a complication, lower limb muscle weakness, which may be ignored. A retrospective study analyzed 2382 patients with QLB, of which the incidence of lower limb muscle weakness of anterior QLB is the highest, up to 65%.¹¹ In this patient, lower limb muscle weakness was not found.

In conclusion, ultrasound-guided anterior subcostal QLB has a significant effect on postoperative analgesia in retroperitoneal laparoscopic kidney surgery, especially for visceral pain. The duration of the effect can reach 24 ~ 48 h, and the patient satisfaction is high. However, this report cannot explain the mechanism of diffusion and action path of QLB local anesthetics through anterior subcostal approach, we only report its analgesic effect through clinical manifestations.

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午夜飞光惊晓月，六时腾焰灿朝霞。元 耶律楚材

摄影：刘恒意 教授 CASA 麻醉医生群

Development of perioperative application of acupuncture anesthesia

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Definition

Acupuncture refers to that under the guidance of the theory of Traditional Chinese Medicine(TCM) the needle(usually refers to the filiform needle) is inserted into the patient's body at a certain angle, which uses twirling and lifting techniques to stimulate the specific region of the human body for treatment of diseases. Acupuncture anesthesia is a unique anesthesia method developed on the basis of acupuncture therapy, using manual acupuncture or electric acupuncture to stimulate a point or acupoints to relieve pain, and the operation can be performed with different anesthetic drugs or without anesthetic drugs. With the development and application of acupoint stimulation technology, it has become a new method for perioperative multimodal treatment and promoting the fast recovery after surgery. Not only the perioperative acupoint stimulation can produce analgesia, sedation, and anti-anxiety, but to reduce the Post-Operative Nausea and Vomiting (PONV) occurrence to some extent, improve the immune function of the body, and play a protective role in the heart and brain and other important organs. In 2003, The World Health Organization (WHO) recommended acupuncture as indications of analgesia and PONV.



The history of the development of acupuncture anesthesia

In 1958, Shanghai First People's Hospital first performed tonsillectomy by needling bilateral Hegu points without using any anesthetic drugs, which was also the first reported acupuncture anesthesia in the world. In 1971, James Reston, a famous journalist for The New York Times, suffered an appendicitis attack while visiting China. Under the direction of Premier Zhou Enlai, Reston underwent appendectomy at Peking Union Medical College Hospital and received acupuncture to relieve the postoperative pain. On July 26, The Front page of The New York Times carried Reston's "Now, About My Operation in Peking" .The article, which documented acupuncture anesthesia, caused a sensation in the United States and sparked international interest in acupuncture. In 1972, Nixon visited China and the delegation visited the thyroidectomy and lobectomy under acupuncture anesthesia. From then on, the international community set off a wave of acupuncture, promoting the treatment of acupuncture to the world. In 1976, traditional medicine was first placed on the agenda at the twenty-ninth World Health Assembly. In 1978, the Traditional Medicine Planning Department was established at Geneva headquarters. In December 1979, Acupuncture was introduced in the WHO's official publication. With the surge of acupuncture in the world, acupuncture anesthesia has attracted attention in the world. With the help of the WHO, the World Federation of Acupuncture Society was established, which promoted the development of traditional medicine.

Single acupuncture anesthesia has deficiencies such as insufficient analgesia, incomplete muscle relaxation, and visceral pull reaction and so on. Therefore, a group of acupuncture anesthesia researchers represented by Professor Jisheng Han and Professor Xiaoding Cao explored deeper about the methods and basic rules of combined acupuncture and medicine anesthesia. The study found that combined acupuncture and western anesthesia can significantly enhance the analgesic effect and reduce the dosage of narcotics. Acupuncture and modern medicine combined anesthesia has gradually become the mainstream of acupuncture anesthesia, including acupuncture combined local anesthesia, acupuncture combined epidural anesthesia and acupuncture combined general anesthesia, which not only can strengthen the analgesic effect of acupuncture anesthesia, but effectively make up for the deficiency of single acupuncture in the past. In 2005, a cardiac operation performed by Professor Wang Xiangrui and his team which was broadcasted alive by BBC in Shanghai Renji Hospital under combined acupuncture and western anesthesia, which spread around the world and marked a new era of acupuncture anesthesia in China. After more than 40 years of development, TCM acupuncture has been studied and clinically applied in 183 countries and regions in the world, and TCM acupuncture has become the most widely used alternative medicine in the world.

Clinical application

Pre-operation

Surgery often causes patients to produce anxiety, fear, tension and other unpleasant emotions, which will lead to sympathetic nervous excitement, resulting in changes in cardiovascular, nervous, endocrine and other systems before surgery. These will have a negative impact on postoperative recovery. Good preoperative communication and education can improve the patient's emotions. But for patients with severe anxiety, communication is unsatisfactory and preoperative medical intervention is generally required. Common medications include benzodiazepines and anticholinergic drugs, which can cause delayed recovery and postoperative delirium. Therefore, the study found that acupuncture at Yintang, Neiguan, Baihui and other acupoints can improve preoperative anxiety and benefit patients. In addition, preemptive analgesia can also produce analgesic effect in advance. Preemptive analgesia can effectively reduce peripheral and central sensitization caused by injurious stimulation and prevents peripheral injury impulse to central transmission, thus reducing the inflammatory reaction caused by surgery, decreasing the memory of pain in the central nervous system, and better controlling postoperative pain and turning to chronic pain.

Intrao-perative

Preoperative acupuncture can reduce the stress response caused by intubation. Acupuncture combined with local anesthesia, epidural anesthesia and general anesthesia can reduce the doses of anesthetics, maintain the stability of intraoperative hemodynamics and play a role in organ protection. In some experimental animal models, acupuncture at different points can improve the function of different organs

For example, in the septic rat model, acupuncture at zusanli can play a part in renal protection by regulating mitochondrial function. In the rat model of focal cerebral ischemia-reperfusion injury, electroacupuncture stimulation of Baihui can participate in the regulation of endoplasmic reticulum function, and then reduce endoplasmic reticulum stress response, and play a protective role of nerve cells. In the model of hypertensive rats, acupuncture at Neiguan and Baihui points can reduce blood pressure and inhibit myocardial remodeling. Acupuncture anesthesia has

certain clinical effects on lung, kidney, liver and other organs protection and perioperative cardio-cerebrovascular function, gastrointestinal function.

Post-operative

Pain is the most common postoperative complication. Inadequate analgesia can limit early postoperative ambulation, increase myocardial oxygen consumption and inhibit gastrointestinal peristalsis. Although commonly used postoperative analgesics such as opioids or non-steroidal anti-inflammatory drugs act quickly, there are more adverse reactions, such as nausea and vomiting, dizziness, skin itching, bleeding, gastrointestinal ulcer and so on. In addition, PONV is prone to occur in some special patients, such as women, children, patients with a history of motion sickness, and patients using volatile anesthetics or opioids during surgery. The commonly used antiemetic drugs can affect cardiac conduction, some can cause delirium, and the safety in children is unclear, which limits their application to a certain extent. As a non-drug intervention, acupuncture can bring the advantages of analgesia without obvious adverse reactions, and maybe a better option for patients. Currently, moderate to high quality evidence supports the effectiveness of acupuncture in the prevention of PONV. In 2003, The WHO recommended analgesia and PONV as indications of acupuncture.

Conclusion

The exact mechanism of acupuncture is still unclear. A large number of studies focused on neurobiology and applied modern molecular biology, genetics, electrophysiology and brain imaging techniques provided experimental evidence and explained the mechanism of traditional acupuncture effects from multiple perspectives and levels. With the in-depth study of the mechanism of acupuncture anesthesia, the application of acupuncture anesthesia technology in thyroid surgery, thoracoscopic lobectomy, cardiopulmonary bypass, cardiac intervention and other procedures has achieved initial success, indicating that acupuncture anesthesia has a broader application prospect. ERAS concept enables closer integration and collaboration between traditional medicine and Western medicine to accelerate patient recovery. At present, there is no comprehensive acupuncture plan for acupuncture anesthesia, and no clear standards of acupuncture time, method, intensity and point compatibility, which will be an urgent problem to be solved in the future.

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Thoracic Epidural Catheter Placement Under Fluoroscopic Imagine Guidance and Incidence of Subdural Catheters

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When I was a Regional Anesthesiology and Acute Pain fellow (2020-2021) at Dartmouth Hitchcock Medical Center, I routinely placed pre-operative thoracic epidurals under fluoroscopic imaging guidance. While this technique is not new, most medical centers in the U.S. do not acquire the setup to place thoracic epidural regularly under imagine guidance prior to thoracic and abdominal surgeries. As a result, I would like to share our findings and the techniques that we used. The original report titled “The Incidence of Subdural Catheter Placement during Epidural Procedure Based on Fluoroscopic Imaging” was published in Regional Anesthesia & Pain Medicine January 2021 edition.



Our colleagues in chronic pain have been placing epidurals with the help of fluoroscopic imaging for many years. While all anesthesiologists have learned how to use anatomic landmark to place epidurals, thoracic epidurals continue to be a bigger challenge compared to lumbar ones in our day to day practice. Aside from difficulty in locating the epidural space in the thoracic region, we may also encounter misplacement of the epidural catheter in openings other than the epidural space. One of these potential spaces is the subdural space. The subdural space is a potential space between the “dura-arachnoid interfaces” as described by Reina et al. It does not exist uniformly and is not necessarily a continuous space.¹ It can be created and extended by traction in dura sacs of cadaver samples or by catheter manipulation in vivo.¹

Previously, the incidence of subdural catheter placement during attempted epidural anesthesia in the acute pain setting was not well quantified. Based on a retrospective review of patients who underwent fluoroscopically guided thoracic epidural catheter placement at Dartmouth-Hitchcock Medical Center in New Hampshire from July 1, 2014 to August 19, 2020, the overall incidence of an inadvertent subdural catheter placement was 5.3 per 1000 (95% Confidence Interval 2.8, 9.0) in 2,472 epidurals.² These subdural catheters were removed and replaced afterward.² The problem of subdural catheter is that it may lead to inadequate analgesia because the dura-arachnoid interface varies in size and local anesthetics tend to distribute posteriorly, sparing anterior nerve roots.³ Additionally, subdural infusions of local anesthesia may lead to serious morbidity such as cardiovascular and respiratory depression.⁴⁻⁶

During my fellowship at Dartmouth-Hitchcock Medical Center, we used a standard 17 gauge Touhy needle to access the epidural space in the low-thoracic or lumbar regions, usually between T12 and L1 or L1 and L2.¹ Under live fluoroscopy, we then threaded a 19 gauge radiopaque epidural catheter (Arrow® TheraCath®) with a single orifice up to the targeted thoracic levels based on analgesic needs.¹ As we injected 2 ml of iohexol contrast (240 mg/ml) through the catheter, we obtained real-time images, allowing us to immediately identify the location of the catheter and make corrections accordingly.¹ Comparisons of epidural contrast distribution and that of subdural catheter placement are demonstrated in Figure 1 and 2 from “The Incidence of Subdural Catheter Placement During Epidural Procedure Based on Fluoroscopic Imaging”.

Dedicated use of fluoroscopy and contrast injections allow us to avoid subdural catheter placement and provide more definitive analgesia to our patients. However, the unique set up of fluoroscopy for epidural catheters in acute pain setting is costly and requires additional training of anesthesiology staff. At this time, most medical centers in the U.S. do not acquire the facility to make this a routine practice.

Figure 1.

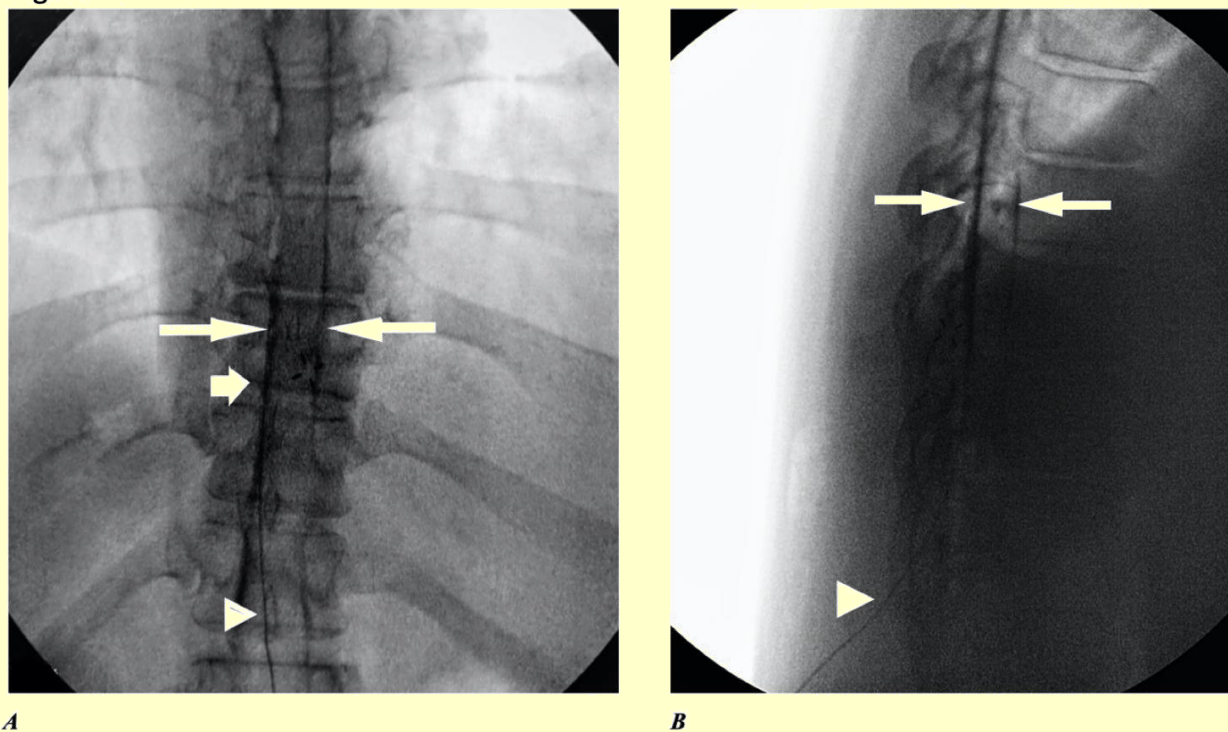


Figure 1 (Sidash et al.). **A classic contrast study for subdural catheter insertion.** **A:** Posterior-anterior fluoroscopic image demonstrating the linear spread of 2ml of Omnipaque contrast consistent with a subdural location. The catheter (*triangle*) projects over the spinal canal. Dense undulating linear contrast extends cephalad and caudal bilaterally conforming to the expected peripheral location of the thecal sac (*long block arrows*). Note the multiple dermatomes to which the contrast extends. Subtle focal contrast outlines the proximal dural sleeves (*short block arrows*) on the left. Absence of nerve root filling defects would be seen in a subarachnoid injection. Diffuse hazy contrast opacification projects over the midline, which can be appreciated more on the lateral image. **B:** Lateral fluoroscopic image demonstrating the linear spread of contrast in the subdural space. Dense linear contrast is ventral to the posterior epidural space extending cephalad and caudal. Smaller dense linear contrast is seen anteriorly with typical "railroad track" (*long block arrows*) appearance of a subdural injection. There is a sharp margin

posteriorly indicating absence of epidural extension. Subarachnoid contrast would maintain a dependent position without anterior extension and be less dense due to CSF dilution.²

Figure 2.

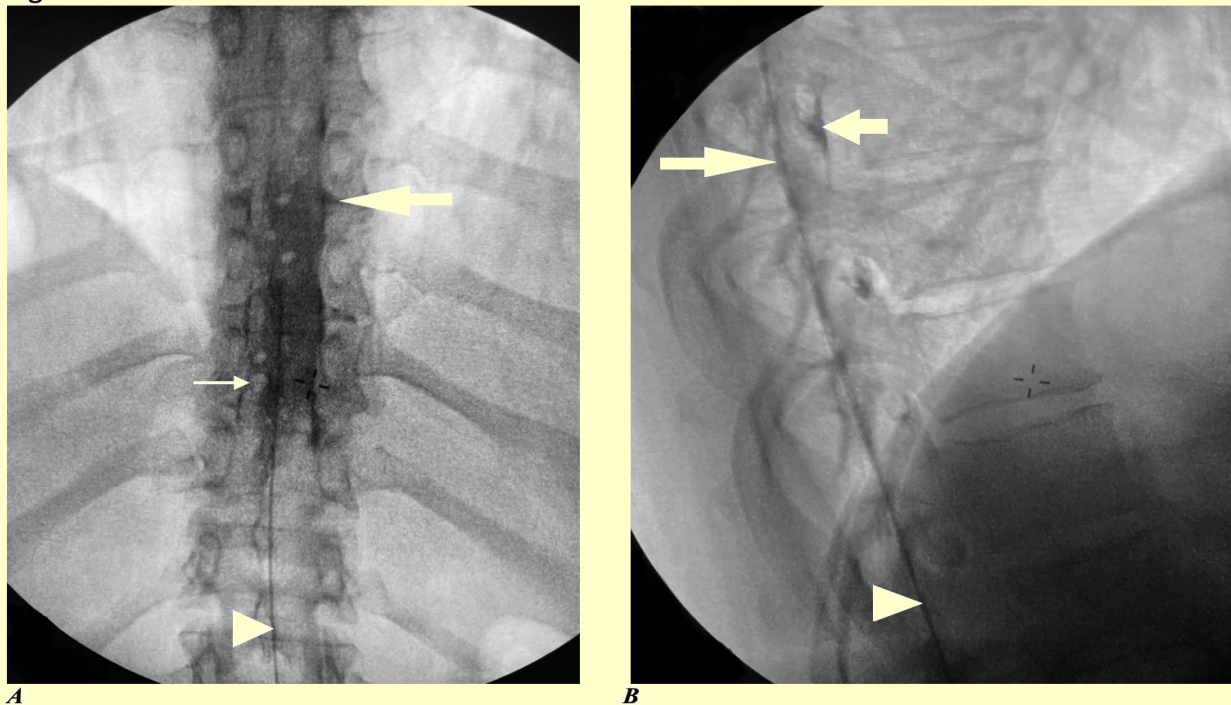


Figure 2 (Sidash et al.) A classic contrast study for epidural catheter insertion. **A:** Frontal projection demonstrates contrast surrounding the thecal sac in the epidural space (*long block arrow*). The central expected location of the thecal sac is less dense than the periphery. The lateral margins of the contrast are seen to thicken and extend toward each neural foramina. The epidural catheter can be easily identified toward the bottom of the image (*triangle*). Note the circular fat globules (*small arrow*), which are indicative of epidural space contrast distribution. **B:** Lateral projection demonstrates linear contrast opacity (*long block arrow*) in a dependent location within the spinal canal, dorsal to the expected location of the thecal sac. There is no ventral contrast. There is contrast seen extending into the neural foramina at multiple levels (*short block arrow*). Ill-defined opacities are seen ventral to the linear contrast in the dorsal epidural space representing contrast lateral to the thecal sac. Again, the epidural catheter (*triangle*) can be seen at the bottom of the image.²

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超声引导弓状韧带上腰方肌前侧阻滞：机制和实现方式

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腰方肌阻滞 (quadratus lumborum block, QLB) 是近年来新发展的阻滞技术, 常复合全麻应用于腹部或髋部手术, 可减少术中全麻药用量, 抑制术后疼痛, 促进患者术后康复。¹⁻⁴ QLB 作用机制复杂, 其中局麻药从腰方肌周围筋膜间隙经过膈肌下缘的内、外侧弓状韧带后方扩散进入胸椎旁间隙是 QLB 获得较高阻滞平面的重要机制之一。⁵⁻⁸ 随着 QLB 的广泛使用, QLB 显现出明显的缺陷: 第一, 阻滞起效时间长, 通常为 20-30min, 这与阻滞后期局麻药需要时间从腰方肌周围筋膜间隙扩散至胸椎旁间隙有关。第二, 局麻药用量大, 且相当一部分局麻药液储留在筋膜间隙内, 而没有完全到达效应部位, 在进行双侧 QLB 时有局麻药中毒的风险。第三, 胸腰筋膜等结构成像质量差时会降低腰方肌阻滞成功率, 导致麻醉效果不稳定。第四, 腹腔镜后腹膜器官的手术可以破坏胸腰筋膜前层, 从而破坏胸腰筋膜的完整性, 导致储存在腰段筋膜内的局麻药液流失, 影响腰方肌阻滞的效果。⁹⁻¹⁰ 最近, 我们提出了一项新的技术“外侧弓状韧带上前侧 QLB”, 在超声引导下直接将药物注射于外侧弓状韧带上的腰方肌前侧, 药物更容易进入低位胸椎旁间隙。在此基础上, 我们又创新和扩展了几种类似技术, 并统一称之为“弓上阻滞技术”。弓上阻滞技术, 避免了传统 QLB 许多弊端, 为腹部手术的术中和术后镇痛提供了一种更优的选择, 在临床麻醉中具有广阔的应用前景。



一、QLB 的入路和作用机制

QLB 是指通过不同路径将局部麻醉药注射在腰方肌附近的筋膜间隙或腰方肌内, 使局部麻醉药在筋膜间隙扩散达到阻滞不同神经节段的目的。QLB 其概念源于 2007 年 Blanco 提出的后路腹横肌平面阻滞。后来, El-Boghdadly 等根据针尖位置将 QLB 分为外侧 QLB (QLB1) 和后侧 QLB (QLB2) 两种: QLB1 由前内侧向后外侧进针, 最终针尖位于腹横肌腱膜之下、腰方肌的前侧方;¹¹⁻¹² 而 QLB2 针尖位置位于腰方肌、背阔肌和竖脊肌之间的腰筋膜内三角 (LIFT)。相继地, 越来越多的入路, 包括穿腰方肌 QLB、肌肉内 QLB 以及肋缘下 QLB 被提出。穿腰方肌 QLB 针尖位于腰大肌和腰方肌之间的筋膜间隙内。而肋缘下 QLB 超声探头呈旁正中矢状面扫描, 针尖位置在 L1-2 水平腰方肌与其前方的胸腰筋膜之间的潜在间隙。穿腰方肌 QLB 和肋缘下 QLB 均属于前侧 QLB。QLB 进针入路不同, 局部麻醉药扩散范围有显著不同, 临床效果也各异。

学者们已经对前侧 QLB 的作用机制进行了详细的研究。Dam 等进行的尸体研究显示, 穿腰方肌 QLB 入路给予 30ml 含有染色剂的溶液后, 解剖发现所有例次的阻滞均有胸椎旁间隙扩散, 最高达 T9 水平, 相应椎旁间隙内的胸交感干及脊神经的腹侧支亦被染色。⁷

Elsharkawy 等研究亦发现 QLB2 和肋缘下入路 QLB 的药液均可达胸椎旁间隙，药液在肋缘下入路甚至可高达 T6 水平。¹³ 另外，腰方肌内 QLB 局麻药液也可扩散至胸椎旁间隙。¹⁴ 由此可见，局麻药向头侧扩散并经过膈肌下缘的内外侧弓状韧带后方进入低位胸椎旁的胸内筋膜下间隙发挥阻滞效应，是前侧 QLB 的重要作用机制。

内侧弓状韧带从 L2 椎体前外侧缘跨越至 L1 椎体横突，外侧弓状韧带从 L1 横突跨越至 T12 肋中段，内外侧弓状韧带共同形成膈肌的下缘。腰大肌表面的腰大肌筋膜和腰方肌表面的胸腰筋膜前层向头侧走行，到达内外侧弓状韧带时分成两层，一层与内外侧弓状韧带融合延续，另一层在弓状韧带后方向头侧延续为胸内筋膜（图 1）。这一解剖学特点构成了前侧 QLB 后局麻药液向胸椎旁胸内筋膜下腔隙扩散的潜在通路，而胸内筋膜下腔隙即为胸神经根所在的区域（图 2）。^{11, 15-16}

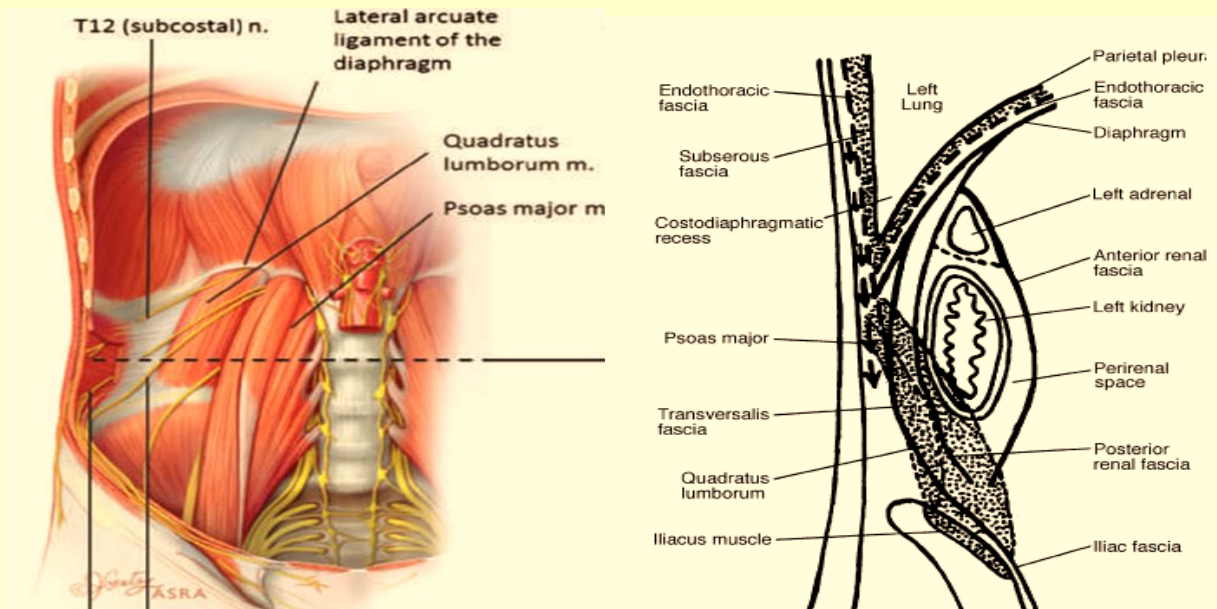


图 1：左图示腰方肌、腰大肌与内外侧弓状韧带；右图为矢状面解剖图，示胸内筋膜下腔与胸腰筋膜前层和腰方肌之间的潜在间隙相通。腰方肌腹侧面由胸腰筋膜前层覆盖，向内与腰大肌筋膜延续，向外侧与腹横筋膜延续，向头侧到达内外侧弓状韧带后分成前后 2 层，前层与内外侧弓状韧带延续，后层与胸内筋膜相延续。这一解剖特点使得 QLB（QLB1、穿腰方肌 QLB 和肋缘下 QLB）局麻药液可沿胸腰筋膜间隙向头侧经内外侧弓状韧带后侧进入胸椎旁间隙。

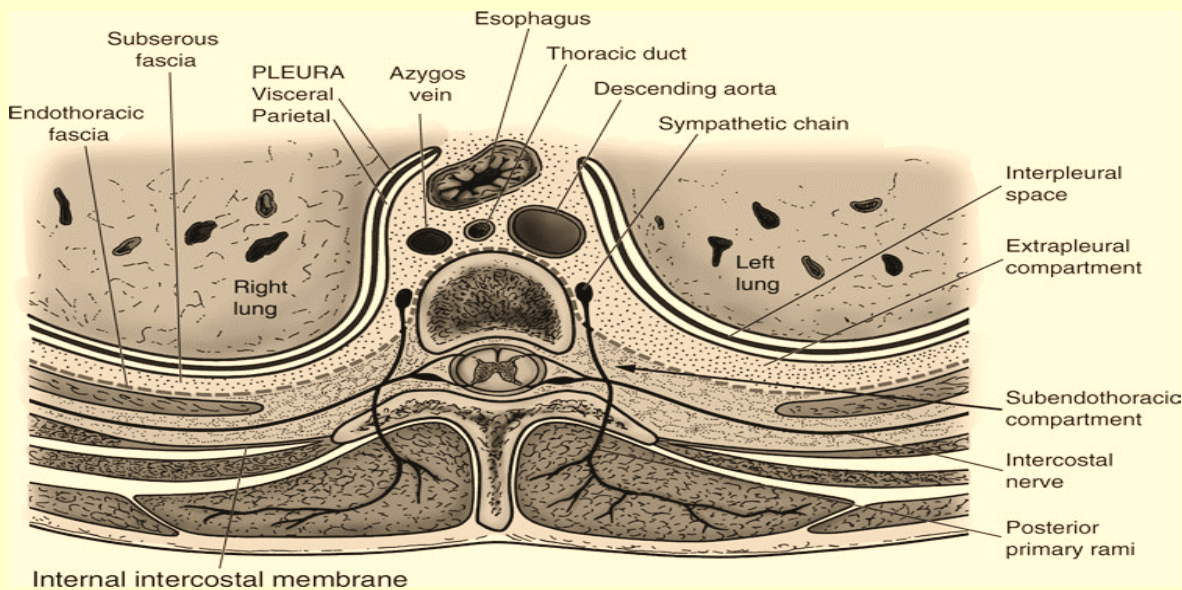


图 2: 胸内筋膜下腔与胸椎旁神经的走行关系。图中虚线即为胸内筋膜, 其背侧椎间孔外区域即为胸内筋膜下腔, 内容纳胸脊神经根前支和后支。腰方肌阻滞局麻药液经内外侧弓状韧带背侧进入胸内筋膜下腔, 即进入胸脊神经根所在的胸椎旁间隙, 从而发挥阻滞胸神经根的作用。Subendothoracic compartment, 胸内筋膜下间隙。Intercostal nerve, 肋间神经。

二、弓状韧带上阻滞技术的提出

既然 QLB 后局麻药液向头侧经内外侧弓状韧带向胸椎旁胸内筋膜下间隙扩散并发挥效应。如果直接将局麻药液注射在外侧弓状韧带以上水平腰方肌的前侧, 药液将直接向低位胸椎旁胸内筋膜下间隙扩散, 而不用克服内外侧弓状韧带这个障碍, 同时药液也不至于大量储留在弓状韧带以下水平的筋膜间隙内。¹⁷

我们详细研究了外侧弓状韧带以上水平腰方肌的解剖毗邻关系。由此, 我们得到 2 个重要发现: 第一, 在外侧弓状韧带以上水平, 腰方肌和膈肌 (胸内筋膜) 之间存在一个对合区。腰方肌起自 T12 肋骨下缘内侧和第 1-4 腰椎横突, 止于髂脊上缘及髂腰韧带。而膈肌下缘的外侧弓状韧带起自 L1 横突跨越腰方肌止于 T12 肋骨中段, 提示在外侧弓状韧带以上水平腰方肌和膈肌存在一个对合区。这一对合区可在横断面 CT 图像上证实。第二, 从横断面 CT 图像上看, 在外侧弓状韧带以上水平, 膈肌和胸内筋膜向椎体前外侧缘走行, 而腰方肌向椎体的小关节或横突方向走行, 导致膈肌 (胸内筋膜) 和腰方肌之间存在一个三角形间隙, 这个三角的底边向 T12 椎旁间隙开口 (图 3)。这是腰方肌阻滞局麻药液通过外侧弓状韧带向低位胸椎旁扩散的重要解剖基础。基于上述两个发现, 我们提出了短轴扫查下“外侧弓状韧带上前侧 QLB”技术 (即膈肌-腰方肌三角阻滞) 和长轴扫查下“外侧弓状韧带上前侧 QLB”技术 (即膈肌-腰方肌对合区阻滞)。¹⁷⁻¹⁸

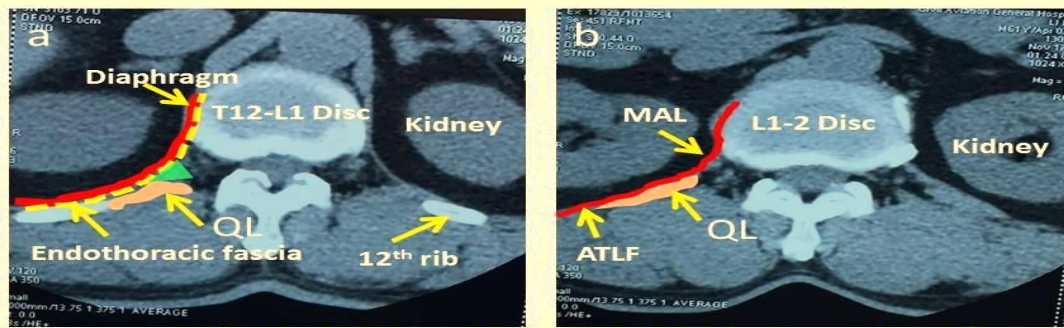


图 3:a 示外侧弓状韧带以上水平 (T12-L1 椎间盘水平), 膈肌 (胸内筋膜) 和腰方肌在外侧存在一个对合区。往内侧走行时, 膈肌和胸内筋膜向椎体前外侧缘走行, 而腰方肌向椎体的小关节或横突方向走行, 导致膈肌 (胸内筋膜) 和腰方肌之间存在一个三角形间隙 (a 图中绿色三角), 这个三角的底边向 T12 椎旁间隙开口。图 b 示在外侧弓状韧带以下水平, 膈肌和胸腰筋膜前层紧贴一起。QL, 腰方肌; Endothoracic fascia, 胸内筋膜; Diaphragm, 膈肌; ATLF, 胸腰筋膜前层; MAL, 内侧弓状韧带; Kidney, 肾脏。

外侧弓状韧带上前侧 QLB 技术, 相对于目前临床常用的腰方肌阻滞有一些优势。第一, 可以避免低位胸椎旁阻滞的风险, 如气胸、Adamkiewicz 动脉损伤等。节段性动脉是脊髓血供的重要来源。节段性动脉分别来自颈深动脉、肋间动脉、腰动脉和骶外侧动脉, 其发出的根动脉经椎间孔入椎管, 主要分为前、后根动脉。较粗大的前根动脉称为 Adamkiewicz 动脉, 又称根最大动脉, 发出位置多在 T8-L3 之间。Adamkiewicz 动脉是下胸段和腰骶段脊髓腹侧的唯一供给动脉, 手术或穿刺损伤时可导致脊髓缺血截瘫。我们提出的这一创新技术穿刺位点位于外侧弓状韧带上腰方肌和膈肌 (胸内筋膜) 对合区 (脊柱中线旁 5-6cm 区域), 远离 T8-L3 的椎旁危险区域, 可避免穿刺损伤 Adamkiewicz 动脉。第二, 胸腰筋膜等结构成像质量差时会降低腰方肌阻滞成功率, 导致麻醉效果不稳定。而外侧弓状韧带上前侧 QLB 技术, 解剖结构简单, 没有复杂的筋膜结构, 更容易获得成功。第三, 腹腔镜后腹膜器官的手术可以破坏胸腰筋膜前层, 从而破坏胸腰筋膜的完整性, 导致储存在腰段筋膜内的局麻药液流失, 影响穿肌肉 QLB 和肋缘下 QLB 的效果。¹⁹ 而外侧弓状韧带上前侧 QLB 技术, 给药位点在弓状韧带以上水平, 直接进入低位胸椎旁间隙。由于弓状韧带张力的存在, 局麻药向尾侧可能流失较少, 虽然这仍需要研究证实。

三、超声引导弓上阻滞的实现方式

弓上阻滞技术有多种实现方式, 本研究组在临床实践中提出了脊柱旁正中短轴扫查技术、脊柱旁正中长轴扫查技术、以弓上膈肌-腰方肌对合区为药液扩散靶标的弓下阻滞技术以及腹腔镜直视下弓上阻滞技术。^{17-18,20} 这些阻滞技术可用于单侧腹部手术、单侧后腹膜腔器官以及全腹部手术 (双侧阻滞) 的临床麻醉和术后镇痛。禁忌证包括凝血障碍、穿刺局部感染、脊柱严重畸形等。

（一）超声引导弓上阻滞——脊柱旁正中短轴扫查技术

1、病人体位和扫查方法

患者通常取侧卧位，屈膝弓背，患者在上。患者侧卧位后，定位 T12-L1 椎旁间隙。在 T12-L1 横断面水平，旁开脊柱中线 3-4cm，将低频凸阵超声探头垂直于脊柱中线放置，进行旁正中短轴扫查，探头标记点向外侧，探头向脊柱中线方向稍倾斜，以使超声波束扫向脊柱椎旁间隙。

2、超声解剖

超声图像上外侧可见高回声的 T12 肋骨骨面，其下为无回声声影；内侧可见典型的高回声的骨面曲线——“驼峰航线”，由深到浅分别为 T12 椎体、椎板（或小关节）和棘突。椎体和椎板（或小关节）之间的小凹陷即为 T12-L1 椎间外孔区域，腰大肌起自于 T12 椎体，此处的腰大肌肌束比较薄弱，往往不能清晰识别。“驼峰航线”的前外侧缘为随呼吸时隐时现的膈肌以及腹腔器官肾脏；吸气时，膈肌下移，可见呈“双轨征”的膈肌。T12-L1 椎旁间隙的背侧为“豆荚”样的腰方肌和横突间韧带。在外侧膈肌与腰方肌贴合（膈肌-腰方肌对合区），膈肌向内侧走行至椎体前外侧方；腰方肌向内侧延续为横突间韧带并附着在小关节腹侧。膈肌和腰方肌的不同走行，使得两者之间出现膈肌-腰方肌三角间隙。该间隙即为穿刺靶区域（图 3）。

3、技术要点

一般采用平面内穿刺技术。在超声探头下极 0.5cm 处（旁开脊柱中线约 2-3cm）局麻浸润；采用 10cm 阻滞穿刺针平面内穿刺，穿刺针进入竖脊肌后调整针尖方向，针尖指向膈肌-腰方肌三角区域，穿刺针突破腰方肌有明显的突破感。针尖到达位置后，给予水分离确认位置正确后，可给予局麻药 15-20ml。

4、注意事项

- （1）膈肌辨识不清时，可嘱患者深呼吸，方便在超声图像上辨识膈肌位置。
- （2）穿刺前，需在“颜色”模式下了解穿刺靶区域是否有异常血管存在。
- （3）冰块法检测麻醉平面常在 T6-7-L1-2 之间。

5、并发症

- （1）膈肌损伤。
- （2）椎管内注射可导致硬膜外阻滞和蛛网膜下腔阻滞，严重时全脊麻，呼吸心跳停止。
- （3）出血和血肿。
- （4）腹腔脏器损伤。

（二）超声引导弓上阻滞——脊柱旁正中长轴扫查技术

1、病人体位和扫查方法

患者通常取侧卧位，屈膝弓背，患者在上。或取俯卧位，俯卧位稳定性较好。使用低频凸阵探头脊柱旁开 6-8cm 长轴扫查腰方肌，探头标记点朝向头侧，识别腰方肌头侧附着点 T12 肋骨，然后超声探头向脊柱正中平移，平移过程中可见 T12 肋骨尾侧的 L1 横突尖声影出现；头尾滑动探头，将 T12 肋骨和 L1 横突尖的声影之间区域成像至超声声像图的中间，这时在超声图像上可见细小的腰方肌深面有随呼吸头尾移动的膈肌。在患者皮肤上标记超声探头最终扫查位置。

2、超声解剖

超声图像上头侧可见高回声的 T12 肋骨骨面，其下为无回声声影；膈肌在超声下表现为腹背两侧高回声的亮线夹着低回声的肌肉，并随呼吸头尾侧运动。膈肌深面为肾脏。当超声探头稍向外侧移动时可见膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层，两者的移行区（膈肌下缘）即为外侧弓状韧带。腰方肌和膈肌之间的间隙，为外侧弓状韧带上腰方肌前侧阻滞穿刺的靶区域（图 4）。¹⁷

3、技术要点

一般采用平面内穿刺技术。消毒铺巾，无菌腔镜套封牢超声探头，将超声探头置于预先标记好的扫描位置，局部调整位置，辨识 T12 肋和 L1 横突尖的声影以及之间的腰方肌和膈肌。然后，采用穿刺针自尾侧向头侧方向行平面内穿刺，当针尖穿过竖脊肌、腰方肌后即可抵达膈肌和腰方肌之间的间隙（图 4）。穿过腰方肌会有明显的突破感。经泵管和穿刺针给予生理盐水 3ml，确认液体在靶间隙扩散，表现为膈肌下压。继而给予局麻药 20-30ml。

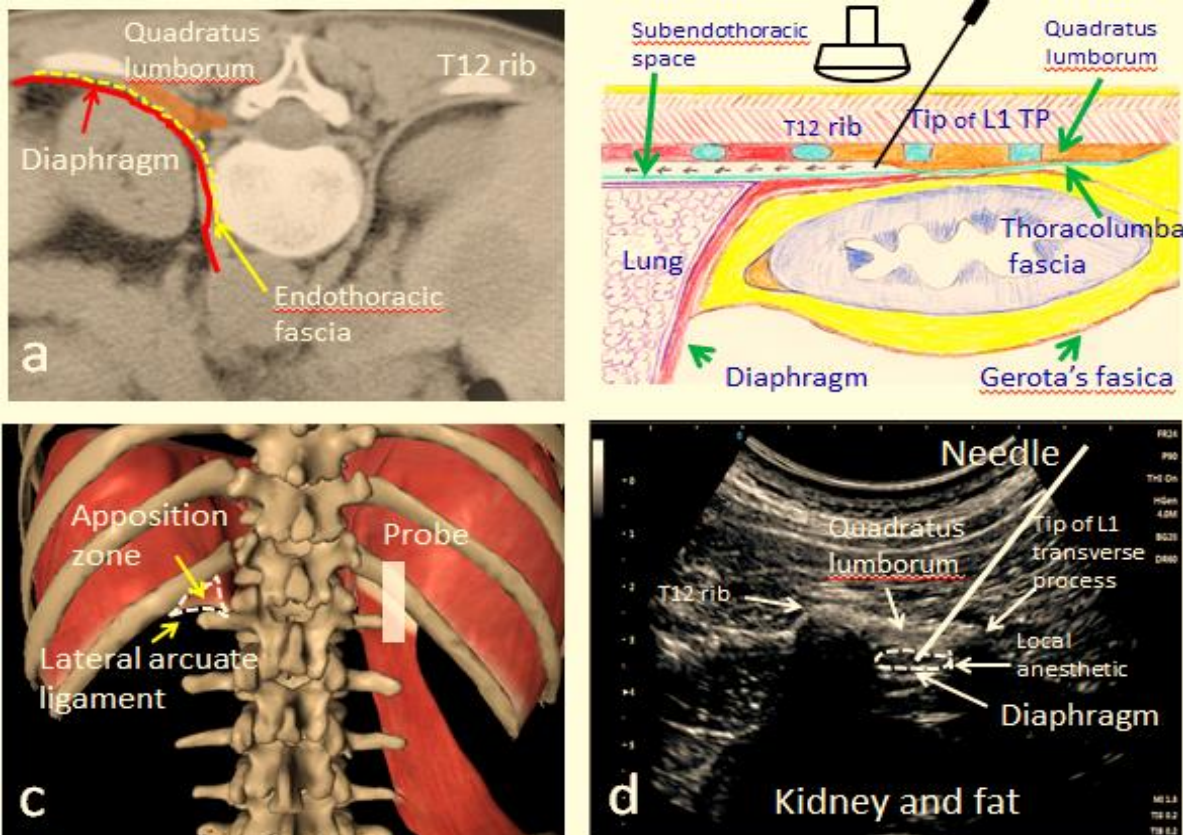


图 4: a 示弓状韧带以上水平 (T12 椎体) 腰方肌、膈肌 (胸内筋膜) 的走行关系, 注意腰方肌和膈肌 (胸内筋膜) 的对合及分离; b 示外侧弓状韧带上腰方肌前侧阻滞的矢状面示意图, 穿刺针给药位置在腰方肌和膈肌 (胸内筋膜) 的对合区; c 示外侧弓状韧带, 腰方肌-膈肌 (胸内筋膜) 对合区以及弓状韧带上腰方肌前侧阻滞时探头的位置; d 示超声引导下穿刺针抵达腰方肌与膈肌 (胸内筋膜) 之间的间隙, 给药后膈肌和胸内筋膜下移。

4、注意事项

(1) 膈肌辨识不清时, 可嘱患者深呼吸, 在 T12 肋尾侧的声窗可见到高回声的胸膜, 通常膈肌和胸膜在同一个水平位置。

(2) 穿刺前, 需在“颜色”模式下了解穿刺靶区域是否有异常血管存在。

(3) 该扫查平面下, 腰方肌呈条状, 不容易辨别。初学者可向外侧平移探头识别到厚实的腰方肌后, 再追踪腰方肌至该扫查平面。

(4) 该技术的关键是在超声图像上识别膈肌下缘的外侧弓状韧带。膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层, 两者的移行区 (膈肌下缘) 即为外侧弓状韧带

(5) 冰块法检测麻醉平面常在 T6-7-L1-2 之间。

(三) 以弓上膈肌-腰方肌对合区为药液扩散靶标的弓下阻滞技术

在部分患者胸膜位置较低。患者吸气时, 胸膜可达 L1 横突。进行外侧弓状韧带上阻滞有气胸风险。在这部分患者, 可行以弓上膈肌-腰方肌对合区为药液扩散靶标的弓下腰方肌前侧阻滞。

1、病人体位和扫查方法

患者可取侧卧位, 屈膝弓背, 患者在上。或取俯卧位, 俯卧位稳定性较好。使用低频凸阵探头脊柱旁开 6-8cm 长轴扫查腰方肌, 探头标记点朝向头侧, 识别腰方肌头侧附着点 T12 肋骨, 然后超声探头向脊柱正中平移, 平移过程中可见 T12 肋骨尾侧的 L1 横突尖声影出现; 头尾滑动探头, 将 T12 肋骨和 L1 横突尖的声影之间区域成像至超声声像图的中间, 这时在超声图像上可见细小的腰方肌深面有随呼吸头尾移动的膈肌。稍向外侧平移超声探头, 至 L1 横突尖刚好消失, 此时超声图像上可见膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层, 两者的移行区 (膈肌下缘) 即为外侧弓状韧带。在患者皮肤上标记超声探头最终扫查位置。

2、超声解剖

超声图像上头侧可见高回声的 T12 肋骨骨面, 其下为无回声声影; 膈肌在超声下表现为腹背两侧高回声的亮线夹着低回声的肌肉, 并随呼吸头尾侧运动。膈肌深面为肾脏。膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层, 两者的移行区 (膈肌下缘) 即为外侧弓状韧带。腰方肌和膈肌之间的间隙 (膈肌-腰方肌对合区) 为药液扩散的靶区域。

3、技术要点

一般采用平面内穿刺技术。消毒铺巾，无菌腔镜套封牢超声探头，将超声探头置于预先标记好的扫描位置，局部调整位置，辨识 T12 肋和 L1 横突尖的声影以及之间的腰方肌和膈肌。稍向外侧平移超声探头，至 L1 横突尖刚好消失，此时超声图像上可见膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层，两者的移行区（膈肌下缘）即为外侧弓状韧带。然后，采用穿刺针自尾侧向头侧方向行平面内穿刺，穿刺目标靶点为外侧弓状韧带下缘的腰方肌和胸腰筋膜前层之间的间隙。穿刺针一次穿过竖脊肌和腰方肌后到达目标区域，经泵管和穿刺针给予生理盐水 3-5ml，确认液体向外侧弓状韧带上的膈肌-腰方肌对合区扩散后，继续给予局麻药物 20-30ml，超声图像上可见膈肌下压。²⁰

4、注意事项

(1) 膈肌辨识不清时，可嘱患者深呼吸，在 T12 肋尾侧的声窗可见到高回声的胸膜，通常膈肌和胸膜在同一个水平位置。

(2) 穿刺前，需在“颜色”模式下了解穿刺靶区域是否有异常血管存在。

(3) 该扫查平面下，腰方肌呈条状，不容易辨别。初学者可向外侧平移探头识别到厚实的腰方肌后，再追踪腰方肌至该扫查平面。

(4) 该技术的关键是在超声图像上识别膈肌下缘的外侧弓状韧带。膈肌在腰方肌深面向尾侧逐步延续为薄层的胸腰筋膜前层，两者的移行区（膈肌下缘）即为外侧弓状韧带。

(5) 该技术的穿刺靶点在外侧弓状韧带下，远离胸膜，可避免气胸并发症。

(6) Elsharkawy 提出肋下腰方肌前侧阻滞技术，超声探头放置在 L1-2 水平进行脊柱旁正中斜长轴扫查，这个扫查位置超声图像上并不能看见膈肌-腰方肌对合区。¹⁶ 我们提出的以弓上膈肌-腰方肌对合区为药液扩散靶标的弓下阻滞技术能够实时观察到药液在弓下注射后是否扩散到膈肌-腰方肌对合区，该技术也可看作是 Elsharkawy 提出的肋缘下腰方肌前侧阻滞技术改良。

(7) 冰块法检测麻醉平面通常在 T6-7-L1-2 之间。

四、总结

目前临床研究发现，弓上阻滞技术具有起效快（<5min），维持时间较长（24-48h），对血流动力学影响小等特点。单侧弓上阻滞可用于侧腹部和腹膜后器官的手术麻醉和术后镇痛，双侧弓上阻滞可为全腹部手术提供术中和术后镇痛。虽然临床应用方面已经对弓上阻滞技术有了较全面的认识，但弓上阻滞药液的扩散规律等尚需进一步的尸体或放射影像学研究。进一步的，还需要加强研究弓上阻滞技术相对于其他神经阻滞技术对外科手术患者的预后影响的比较研究。

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危机关头的领导力 - 记 2021 美国麻醉年会特约主讲嘉宾 Doris Kearns Goodwin 博士

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金秋十月，我终于如愿以偿地登上了从纽约飞往圣地亚哥的飞机。为了参加 2021 年十月的 ASA 美国麻醉年会，我特意在会议之前两周打了 Pfizer 第三针疫苗。这是新冠以来，ASA 第一次召开现场会议。从某种意义上说，这也许标志着我们的生活学习都开始逐步走向正轨。



Doris Kearns Goodwin, Presidential historian and Pulitzer Prize-winning author. Photo by Annie Leibovitz

周六一大早，keynote 主题讲座会场已经人潮涌动。今年 ASA 迎来了一位不同寻常的特约嘉宾。那就是美国著名的历史学家，传记作家，著名政治评论家，也是美国作家最高奖项普利策奖

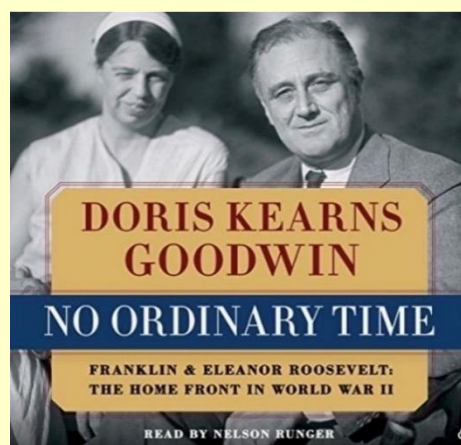
（Pulitzer Prize）的获得者，Doris Kearns Goodwin 博士（图一）。她今天的主题讲座题目是“危机关头的领导力”（Leadership In Turbulent Times）。这个题目也是她 2018 年出版的历史书的名字。



（图二）

Doris Kearns Goodwin 于 1943 年出生在纽约布鲁克林一个爱尔兰后裔的家庭。她在 Maine 的 Colby college 获得艺术专业学士学位，1968 年在哈佛获得“政府”

（government）专业博士学位。1967 年到 1968 年，她很荣幸地被选中在白宫做了两年实习生，时任美国总统是 Lyndon B Johnson。Doris Kearns 当时并未想到自己会入选，因为她刚刚发表了一篇反对越战的文章，题目是“怎样把 LBJ 赶下台”（How to dump Lyndon Johnson）。LBJ 总统在白宫的舞会上，不无风趣地告诉她说“如果我不能够赢得 Doris Kearns 女士，我怎么能说服美国人民这次战争是值得的呢？”。白宫的经历为 Doris Kearns Goodwin 后来成为知名政治评论家和总统传记作家奠定了良好的基础。在她五十年的写作生涯里，写过七本总统传记，她最为著名的著作是 1995 年出版的，描写二战时期美国第一家庭的历史传记“*No ordinary time: Franklin and Eleanor Roosevelt: the home in front of World War II*”。（图三）



这部传记，不仅让她获得了美国作家的最高奖项普利策奖（Pulitzer Prize）历史类，同时，也让她登上了当时纽约时报畅销书的榜首。她的另外一部极为著名的传记是“Team of Rivals: The Political Genius of Abraham Lincoln”。这本书的部分内容也大导演 Steven Spielberg 斯皮尔伯格搬到了电影“林肯”上。

我们不禁要问，为什么美国麻醉年会破天荒地请一位非医学专业的人士作为主讲嘉宾呢？众所周知，Covid 19 几乎彻底改变了我们的生活。不仅仅美国社会陷入领袖信任危机，医疗行业也面临着前所未有的挑战。我们需要重新定义“领导力”这个概念，究竟怎样的业界领袖可以带领大家走出困境。在这个时候 ASA 请 Goodwin 做为主讲嘉宾是最恰当及时不过的了。Goodwin 博士认为，当我们面对恐惧和对未来不确定的时候，不妨翻开历史的画卷。你会发现，我们目前的处境，真的不是最糟糕的。历史曾给我们深刻的教训；也让我们在经历困难的时候变得更加从容镇定；最为重要的是，历史教会了我们乐观和对未来充满信心。

这次演讲是以访谈的形式进行的。会议一开始，我和所有在场的麻醉同行一样，立刻被 Goodwin 博士的从容优雅和美丽所吸引。然而最让我震惊的还是现年 78 岁的 Goodwin 博士，不仅洞察力敏锐，思维谈吐也异乎寻常的敏捷。

首先，在回答领袖应该具备的特质的时候，Goodwin 博士谈到几点，比如同情心（empathy），百折不挠的精神（Resilient），雄心（ambition），道德感（morality），谦逊（humility）等。具体的说，比如作为领袖的雄心，就不单纯只是个人奋斗和自我实现，更重要的是超越自我的团队精神和服务于大众的理念。关于百折不挠的精神（resilient），我们大家都知道 Franklin 罗斯福是患有 Polio 脊髓灰质炎后遗症的，突如其来的下肢瘫痪并没有让他从此一蹶不振，而是让他更加体会到了大众的疾苦。身体的残疾并没有把他打垮，他在休整一段时间后，返回政坛，他最终带领美国走出大萧条，并取得了二战的胜利。

在谈到团队的时候，Doris Kearns Goodwin 女士认为，一个优秀的团队是成功的保证。她谈到美国内战时期，林肯的内阁的阵容是非常强大的；林肯不惜使用很多虽然反对他，但又非常有才干的人；他的内阁中甚至不乏他的竞争对手。有人不解地问，“您为什么要这样做呢？”林肯这样回答，“你可能不了解，把优秀的人留在内阁是符合美国的国家利益的。”从这里我们也可以看出林肯作为一个卓越的政治家的博大胸怀。林肯的另一个伟大之处，在于他可以认真地倾听不同的意见，他会花大量的时间跟每一个内阁成员都做深入的交流沟通，他永远都是一个最好的听众；同时他又有很好的综合决策能力，他可以非常坚定地把他的方案贯彻执行下去，即使反对他观点的人也会最终支持他的决策。

在谈到面临挑战的时候如何减压的问题，Goodwin 讲了几个林肯和两位罗斯福总统的小故事。林肯在美国内战的时候就患有严重的抑郁症，几乎到了要自杀的地步。后来他减压的方式就是经常去剧院看剧，他在内战期间一共看了 100 多场剧。有人甚至批评他在国难当头的时候总去剧院，有点儿不务正业。但他觉得当剧场的灯光点亮，他会沉浸在莎士比亚的剧情里，暂时忘记那场兄弟互相残杀的内战带给他的困扰。不幸的是，这样一个深受美国人民爱戴的总统，却在内战结束的时候，在他钟爱的剧院里被反对者枪杀了。跟林肯总统不同，Teddy 罗斯福 (TR) 总统则是通过运动来减压的。他几乎每天下午都会花两个小时锻炼，他特别喜欢拳击和登山，这不仅让他保持良好的体力，也让他在面对危机时候，始终保持积极乐观的态度。从医学的角度讲，运动的确可以提高体内儿茶酚胺的分



泌，从而改善人的情绪。Franklin 罗斯福（FDR）减压的办法则是经常举办鸡尾酒会，而且规定大家在鸡尾酒会上只能闲聊。这样也让他暂时忘记二战的喧嚣。我也从而想到，新冠以来做为在临床一线的医务工作者所面临的前所未有的压力，新冠一开始，就有医生患上了抑郁症甚至自杀。或许我们都应该从几位总统的个人经历中，找到适合自己的减压方式，从而不被周围的死亡和压力所摧垮。

(图 4) 在新冠疫情中自杀的急诊科医生，Dr. Breen (from New York Times)

最后在谈到如何才能成为一个出色的领导人或者业界领袖的时候，Goodwin 建议年轻人应该去不同的地方工作生活一段时间，了解那里的风土人文。她举了一个她的小儿子的例子。Goodwin 博士的小儿子毕业于哈佛大学，他从来没有想到自己会参军。但 9.11 以后他选择了去伊拉克和阿富汗当兵，Goodwin 对儿子的决定给予了大力的支持。在部队的经历让他了解到来自不同地域的战士们的想法，让他更能够包容和理解不同的声音和观点。这些战士虽然来自美国不同的地域，思想有很大分歧，但是他们有共同的目标 (common mission)，正是这个共同目标把他们团结在了一起。这些部队的经历无疑成为 Goodwin 的儿子后来从 Harvard law school 毕业后，为银行 CEO 服务的宝贵财富。

Goodwin 博士有关“危机关头的领导力”的著作不仅激励着各界的领袖人物，也为我们每个人的日常生活提供了可贵的借鉴。在飞回纽约的飞机上，我的心情依然久久不能平复，Goodwin 博士的演说不时萦绕在脑海。回顾历史，可以让我们认清我们目前所处的位置，也可以让我们更清醒地展望未来。新冠大流行在波涛汹涌的历史长河里，也许只是一簇微不足道的浪花；艰难的岁月终将过去，让我们以史为鉴，共度难关。

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4. “No Ordinary time: Franklin and Eleanor Roosevelt: the home in front world war II” 1995 by Doris Kearns Goodwin.
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CASA ZOOM 会议-1

呃逆的困惑和策略

苗宁, 黄建宏, MD

CASA President-黄建宏教授策划已久的线上讨论会：聊聊麻醉的困惑和策略（之一）在 8/21/2021 19:30 在 Zoom 成功举办并圆满完成。老中青麻醉医生同行参与了此会。尤其感谢几位直接从大陆进入美国麻醉住院医师培训的 CA-1 和 CA-2 的年轻麻醉医生的参与并向大家做了简短的自我介绍。

此次讨论会的主题为“麻醉所致 Hiccup 的诱因，可能机理，发生率和治疗措施”。大家聚会轻松愉快，非正式交流各自对 Hiccup 的体会和经验。讨论会由刘恒意教授首讲关于 Hiccup 所做的临床研究并发表过的文章。刘教授指出：呃逆是一种突然膈肌和肋间肌不自主收缩导致突然声门的吸气和闭合。正常人中呃逆十分常见，发作具有多种原因。术中呃逆可能由以下原因引起：麻醉技术和/或麻醉药物和其它药物。喉罩气道可能导致术中呃逆，发病率估计在 1-5%。术中呃逆可以通过药物治疗：抗胆碱能药物阿托品、咪达唑仑、质子泵抑制剂和氯丙嗪等。它也可以通过非药物处理：胃部抽吸以减少胃部积液积气，合谷穴位注射 1/8 毫升 versed，局麻药阻断膈神经，枕下松解术，和星状神经节阻滞。所有治疗策略都是试图阻断呃逆反射弧（刘教授的文章发表见后）。

胡灵群教授随后讲述使用中西医合璧方法，即 Midazolam 或 promethazine 1/8 毫升合谷穴注射治疗顽固性 Hiccup 这一非常令人感兴趣的个人经验（胡教授的文章见后）。

会后大家仍在热切讨论 Hiccup 治疗可能的临床研究和案例分析；中西医联合“合谷穴位”药物注射治疗 Hiccup 的可能机理，有效性，医疗合法性，是否符合临床治疗标准，何时注射，患者知情权；其他药物或其他穴位治疗的可能性等等。



多人查阅了中医文献关于穴位注射治疗呃逆的报道。穴位注射缓解顽固性呃逆已经有很久的历史。术中也有穴位注射治疗呃逆的成功案例。具体做法是：先确定穴位的位置，做好标记，常规用皮肤消毒液做无菌消毒皮肤，垂直进针，深度大约 1.5 厘米，进针后患者有酸麻重胀的感觉，注射后拨针，再压迫片刻。大部分文献都是注射足三里穴位来治疗顽固呃逆，也有一些注射合谷穴位的成功报道。常用的注射药物包括：氯丙嗪，Vit K。

与会者和一些值班或有其他事情而无法参与讨论会的医生共同认为，在轻松愉快的氛围下大家讨论交流一些临床常见病症，互相学习各自的处理和心得值得提倡，大家期待继续不定期举办相似的麻醉困惑和策略讨论会。还有一些医生已经“迫不及待”地提出后期研讨会讨论的可能病症和处理疑惑。期待不久之后大家在线上再见。

术中呃逆

-Intraoperative Hiccup

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呃逆，俗称打嗝，英文 Hiccup（英文学名 singultus），是一种比较普遍的现象，通常是突然出现并很快消失。呃逆可以影响任何性别，任何年龄，¹ 甚至胎儿在子宫内也有呃逆。¹

一，呃逆分类

持续时间：在大多数情况下，呃逆会自发消失，但也可持续较长时间。² 根据呃逆的持续时间，它被归类为：急性呃逆-发作少于 48 小时，持续或长期呃逆-超过 48 小时，以及顽固呃逆-超过 1-2 个月（表 1）。^{1, 3}

表-1 呃逆的分类

呃逆分类	急性呃逆	持续或长期呃逆	顽固的呃逆
呃逆持续时间	<48 小时	48 小时—1 个月	>1-2 个月

长时间的呃逆通常表明病人身体的某种病理状况。中枢神经系统（CNS）肿瘤，毒性代谢异常或者心源性的因素等都可以引起呃逆。⁴ 持续数小时到数天的呃逆，对生活质量产生不利影响，身体精疲力竭，无法进食而体重减轻，以及巨大的心理痛苦。⁵

呃逆也可能继发于许多病理状态，例如肾功能障碍、糖尿病、电解质失衡、胃食管返流病（GERD），食管裂孔疝和腹部癌症。^{1, 5}

呃逆通常是由于各种刺激引起呃逆反射。¹ 虽然呃逆反射似乎已经被认识，但呃逆的生理功能尚不清楚，它是一种知之甚少的现象，没有明确解释呃逆的原因。通常认为呃逆为原始胎儿反射以阻止羊水吞咽，古老的鳃通气模式，胎儿准备用于独立呼吸⁵ 或程序化等距吸气肌锻炼，这种观点认为新生儿期过后呃逆就丧失其生理功效。

术中呃逆很大程度上与技术有关。使用喉罩气道是术中呃逆的常见原因之一。⁶ 喉罩气道作为气道装置很实用，避免了一些与气管插管相关的问题，同时喉罩气道提供患者自主呼吸。但是，喉罩气道也会引起一些并发症，如喉痛、吞咽困难、气道创伤和声音嘶哑。也有报道称喉罩引起呃逆。但喉罩气道相关的呃逆不是很常见的并发症，发病率在 1-5% 的范围内。⁶

二、呃逆的生理机制

呃逆是一种不自主的肌阵挛，急速发生的膈肌和肋间肌痉挛收缩，导致突然的声门关闭，发出声音 hic。⁷ 它被认为由反射弧介导。经由迷走神经、膈神经和 T6-12 交感神经链传入冲动上传到大脑延髓的呃逆中心（位于延髓的后外侧部分脑干的长圆形部位）。其传出途径由膈神经的运动纤维传导到膈肌，以及脊神经至肋间神经传导到肋间肌。刺激传入通道的任何部位都可能导致呃逆。⁸ 呃逆通常会因为触发性刺激而突然出现，突然结束。相对较常引起呃逆的喉罩，其远端位于食管近端，突然插入喉罩刺激食道近端机械感受器而触发呃逆反射。⁹ 迷走神经支配咽部和上食道，据推测插入或快速膨胀 LMA 时可刺激迷走神经而触发呃逆。正压通气（PEEP）也可致呃逆。因为气道正压通气可刺激呼吸系统从而引起呃逆。¹⁰

三、术中呃逆的病因

1. 围术期呃逆常见原因：各种麻醉技术，镇静（MAC），全静脉麻醉，面罩全麻等。
2. 过食和碳酸饮料也被认为是触发呃逆的原因。
3. 麻醉使用的某些药物：包括硫喷妥钠，咪达唑仑，阿片类药物，以及丙泊酚等。
4. 麻醉诱导前后的面罩通气可能会导致胃过度膨胀，导致术中呃逆。
5. 其它药物也会引起呃逆：如地塞米松。阿立哌唑甚至可诱发持续呃逆。

四、喉罩气道相关性呃逆

1. 发病率

喉罩气道相关性呃逆的发生率估计约为 5%。在一项由 Bapat 主导的研究中，喉罩相关呃逆的发生率因麻醉诱导剂的不同而不同。他们报告丙泊酚、硫喷妥钠+利多卡因、硫喷妥钠+咪达唑仑的发生率分别为 2%、4% 和 14%。¹

2. 风险因素

早在 1981 年引入喉罩气道以来，各种新型号的声门上装置 (SGAD) 提供更安全可靠的气道装置。不同型号的喉罩可能对呃逆发生率有不同的影响。传统喉罩诱导 5.3% 的患者呃逆，而 COPA 是 1.7% (P < 0.03%)，ProSeal 是 1.6% (P < 0.03%)。¹

电解质失衡，如低钠血症、低钾血症、低钙血症可能会出现呃逆。肾功能不全，尤其是尿毒症患者可能在术中出现呃逆，虽然它与慢性呃逆的关系是众所周知的。¹

五、诊断

日常生活中不难诊断呃逆：经典的“hic”声音，急性发作和自行终止。术中呃逆的诊断较为困难，因为术中无典型“hic”声音。但横膈膜的肌肉阵挛收缩和突然吸气的肋间肌运动仍可表明呃逆。其它临床表现可能包括血流动力学紊乱，心律失常等。

六、临床处理

围术期呃逆现在尚无明确治疗指南。为中断呃逆反射弧可用多种方法和药物治疗 [表-2] 。

表-2 围术期呃逆的治疗选项¹

静脉药物治疗	Metoclopramide Proton pump inhibitors Anticholinergic agents: atropine, glycopyrrolate Midazolam Chlorpromazine Nifedipine
非药物治疗	Phrenic nerve block Acupuncture: 穴位 injection of versed or lidocaine De-air stomach by suction Stellate ganglion block Sub-occipital release technique

七、讨论

这次讨论既有多位高年资的教授参加，也有正在进行住院医师培训的年轻学者。俄亥俄大学的胡灵群教授给多位病人用过合谷穴位注射 1/8 毫升 versed，据称有很好效果。他还介绍说，如果干针刺激合谷穴或者穴位压力刺激则无效果。张晓燕教授根据自己的经验认为“恐吓”可能也有一定效果。刘恒意教授试用过 Glycopyrrolate。王景平教授试用过 Metoproclamide。但是，这些干预措施因为很难进行大样本的前瞻性临床研究，很难成为临床实践指南。

会后我们查阅了中医文献关于穴位注射治疗呃逆的报道。11 穴位注射缓解顽固性呃逆已经有很久的历史。术中应用穴位注射治疗呃逆的成功案例也有。具体做法是：先确定穴位的位置，做好标记，常规用皮肤消毒液做无菌消毒皮肤，垂直进针，深度大约 1.5 厘米，进针后患者有酸麻重胀的感觉，注射后拨针，再压迫片刻。大部分文献都是注射足

三里穴位来治疗顽固呃逆，也有一些注射合谷穴位的成功报道。常用的注射药物包括：氯丙嗪，Vitamine K。

八，总结

呃逆是一种突然膈肌和肋间肌不自主收缩导致突然声门的吸气和闭合。正常人中呃逆十分常见，它有多种病因。术中呃逆可能由以下原因引起：麻醉技术和/或麻醉药物，以及其它药物。喉罩气道可能导致术中呃逆，发病率估计在 1-5%。术中呃逆可以通过药物治疗：抗胆碱能药物阿托品、咪达唑仑、质子泵抑制剂和氯丙嗪等。它也可以通过非药物处理：胃部抽吸以减少胃部积液积气，穴位注射，局麻药阻断膈神经，枕下松解术，和星状神经节阻滞。所有治疗策略都是试图阻断呃逆反射弧。

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呃逆故事 30 载有余

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手术中的呃逆是一个少见的问题，被认为由膈肌痉挛所致，临床处理上比较棘手。至今，我们还没有一个规范（standard of care）医疗，也没有一种被证实是有效的治疗方法，尤其是在清醒患者。

我在加拿大渥太华工作期间，参与的一次大查房讨论了一位顽固性呃逆患者。他曾跑遍加拿大首都的所有急诊室没有办法终止呃逆，不幸导致大面积吸入性肺炎，进重症病房，气管插管，呼吸机辅助呼吸。患者的胸片显示双侧肺野均匀满布草莓样病灶[图 1]。相对于最早我做内科医生遇到的，并引起我关注到呃逆的一位晚期尿毒症患者，以及后来加拿大温哥华罹患后腹膜淋巴瘤晚期的朋友，这位渥太华患者还算是幸运的，因为后面二位最终都带着呃逆离开了人世。

从那位顽固性呃逆且患有晚期尿毒症病人，我了解到了患者合谷针刺（1mL 胰岛素针筒，27G 1/2 英寸针头）（图 2，图 3）并注射氯丙嗪 1/8 毫升（25 mg/mL）可能有效。¹不幸的是他的呃逆止住后 2-3 小时复发。重复使用虽然有效，但因为患者全身水肿明显，手掌也不例外，针眼渗液不止，最后只能放弃。这种反复可能是原发性膈肌刺激的病因持续存在的结果。温哥华那位有腹膜后肿块的朋友也类似，通过电话远程指导使用合谷按摩（accupressure），没能缓解呃逆。这种远水救不了近火的遗憾至今还在记忆中。我只能自我安慰，因当时还没有北美的行医资格，假使到了床边也无济于事，治好了呃逆也挡不住淋巴瘤的肆虐。

在上世纪九十年代末我的临床麻醉住院医生培训过程中，正值喉罩开始广泛使用的时候，对喉罩全麻患者出现呃逆的情况也有些意外。² 在主治医师的准许下，我开始试用当年的合谷局部刺激后药物注射的办法治疗呃逆。因为手术室并没有氯丙嗪，开始从徒手合谷按摩，到合谷局部用手头可以发现的最细的 27g 针刺刺激，再加入手头现有药物如生理盐水、利多卡因、非那根/异丙嗪、芬太尼、咪达唑仑等注射，期待通过药物机理止住呃逆。最后的印象是咪达唑仑、非那根、芬太尼似乎有效。从局部药物刺激角度，药物化学成份、药物酸碱度、渗透压等因素可能更能解释有效药物的作用机制，比如，咪达唑仑、芬太尼、非那根、利多卡因的 pH 值分别为：3-3.6、4.0-5.5、4.0-7.5、5.8-6.3，而氯丙嗪的 pH 值为 4-5。从这层意义上看，局部刺激较厉害的丙泊酚或许有用，但没有使用过，无法告知。

当然，手术中呃逆发生率比较低，且通常自我缓解，做这类药物随机双盲试验的可行性比较低。因为没有对照分组研究，存在几个偏倚问题，如，观察者偏倚（非客观性），结论性偏倚（认为有效在先）。不过，从全麻患者的治疗经历中，我们倒是避免了一个安

慰剂或患者暗示作用。这种作用可以从我密歇根大学的一个脑肿瘤活检手术后的三次呃逆治疗经历中体会到。

在术后随访中了解到，这位脑肿瘤活检病人手术后一直呃逆，用尽了所有可能有效的方法无效，出不了重症病房。因为当时我是在两台手术之间的间隙随访，时间比较紧，当时给了左侧（遵循我们常说的男左女右的思维）合谷针刺刺激加咪达唑仑 1/8 mL 注射后 5 分钟无效，再于右侧合谷刺激注射完后，便回了手术间。事后从一起手术的神经外科住院总医生那里得知，患者在我走后不久停止了呃逆，持续了 6 个多小时，在美睡了一觉起来后复发。次日，应邀做了第二次治疗，首选了右侧合谷（只是考虑到上次有个前后关联，或许是必然性，或许是心因性）刺激注射，5 分钟内患者呃逆停止。手术后第三天患者的呃逆缓解 20 多小时，转去普通病房后再度复发。第三次呃逆停止并不是药物的作用。我一出现在他床前，他的呃逆自行停止，并不需要刺激注射，而且住院期间再也没有复发。这个或许是暗示作用，发生了 1/3 次，和平时我们看到的安慰剂效应的 20-30% 非常接近了。

我在美国工作过的四所大学医院都使用过合谷刺激注射法治疗呃逆，或许是选择性记忆的缘故，没有过失败的例子。

合谷刺激注射治疗呃逆的机理并不清楚。相对来说，呃逆发生机理似乎还容易理解一些。前面提及的晚期尿毒症患者和后腹膜淋巴瘤患者，与喉罩全麻下发生呃逆的共同之处是膈肌受到了刺激。

2017 年前我做了一项临床试验，通过自己创作的手法（External Larynx Lift, ELL 法），³ 放置了至少 450 个喉罩。其中为一位 100 公斤左右的患者的三次不同膝关节手术/操作做了三次喉罩全麻（当然只有第一次能作为研究病例）。出人意外的是，在我第三次遇到他的时候，他提到前两次手术后喝汽水出现呃逆的现象，而且重复出现。当时和他讨论了可能的原因：他或许因为喉罩全麻导致胃泡内气体增加，而且胃蠕动因为麻醉药物及手术应激而减缓，汽水里的碳酸氢钠在遇到胃酸后释放出很多二氧化碳，使他的胃泡扩张刺激了膈肌所产生，可能是我们喝汽水打嗝的术后表现形式。基于这一解释，我征得患者同意，做了一个尝试。在手术前静脉给药胃复安 10mg，使用了第三代喉罩 Supreme 全麻 [图 4]，手术时通过 Supreme 胃管吸除胃内容物和气体，而麻醉的其他方法和药物全部一样。他在复苏二期中回家喝汽水，2 天后电话随访，这次他没有再出现术后呃逆。早产儿经常出现顽固性呃逆，可能是由于神经系统发育不全所致的“过激”，或与阈值过低有关。⁴ 麻醉下放置喉罩后出现呃逆的机理或许两方面都有。

鉴于膈肌受刺激的机理，理论上，全麻患者可以采用短效司可林阻断，尤其考虑到它先阻断中央型肌肉，再阻断周边肌肉的现象，即先阻断膈肌和辅助呼吸肌再阻断周围肌肉，值得一试。虽然北美临床上喉罩全麻时不太常给肌松剂，但欧洲常规使用肌松剂做喉罩全麻，在有多位英国受训麻醉科医生的密歇根大学也常用。从权衡利弊的角度，这种处理并非无益。研究发现，使用肌松剂喉罩全麻患者在取得同样密封压（sealing pressure）的情况下气囊充气量减少，气囊内压（cuff pressure）降低，手术后口咽部疼痛减少。⁵ 对于清醒病人的呃逆，可以通过膈神经阻滞使膈肌瘫痪，但同时双侧阻滞却是临床禁忌。采用像电疗（Electroconvulsive therapy, ECT）时用的面罩全麻肌松短效肌松可能是个有效的方法，但没有人研究过。从方法的简易程度、介入的“侵入性”和副

作用角度，相对于膈神经阻滞和面罩全麻，合谷刺激注射法的优势变得显而易见，有其可取之处，虽然它的有效性至今还没有获得公认，也不是规范化的措施。

对于没有规范治疗的病症，通过寻求替换疗法符合医德准则。而在选择不同方法过程中，应权衡利弊，遵循副作用和并发症较少的原则，这在合谷针刺、药物注射治疗呃逆的思维和运作中都得到了体现。这就不难理解，我在西北大学芬堡医学院附属纪念医院的前同事和俄亥俄州立大学 Wexner 医学中心的现同事中，有人首选这种方法治疗呃逆。期待有一天出现确凿证据证实或否定这种方式，或者出现更为确定的治疗方法。

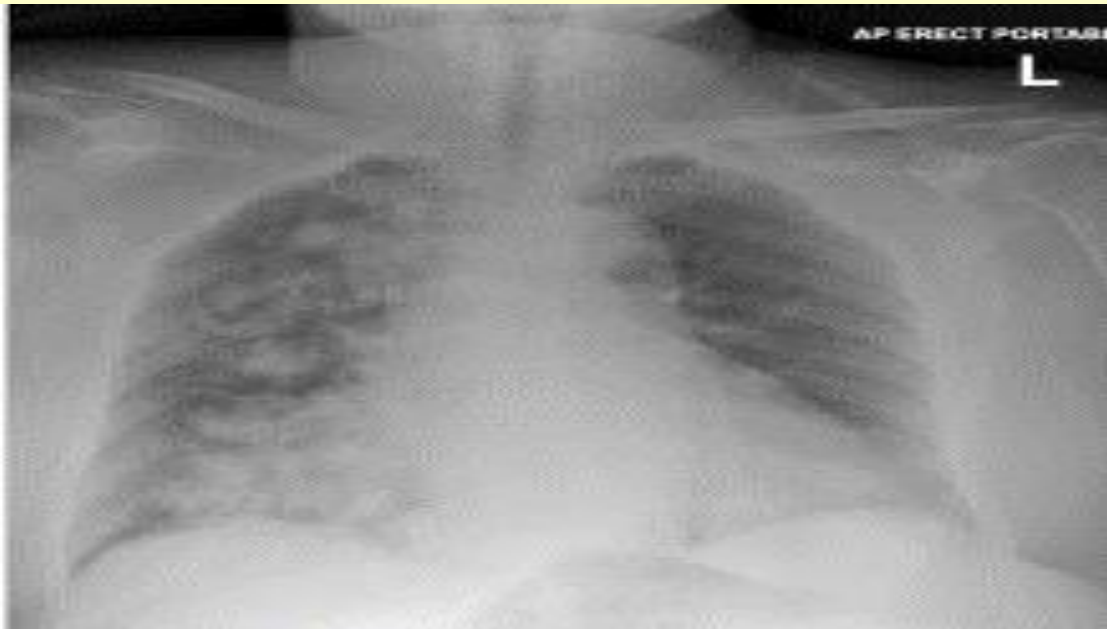


图 1. 吸入性肺炎示范胸片（并非该患者的, 来自
<http://www.svuhradiology.ie/casestudy/aspiration-pneumonia/>）



图 2. 带 27G 1/2 英寸针头的胰岛素针管

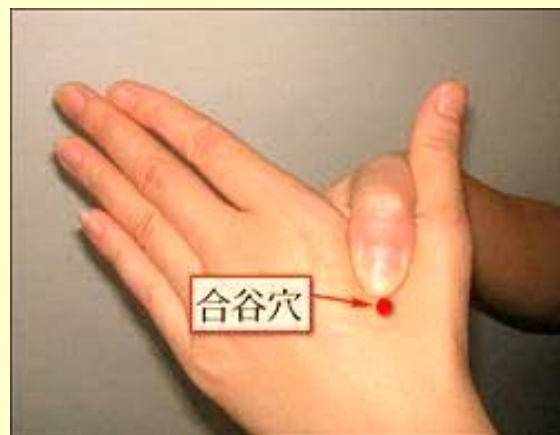


图 3. 合谷的位置（患者自己拇指指骨关节横纹，放在对侧手拇、食指之间的指

蹠緣上，指尖即为合谷的位置)

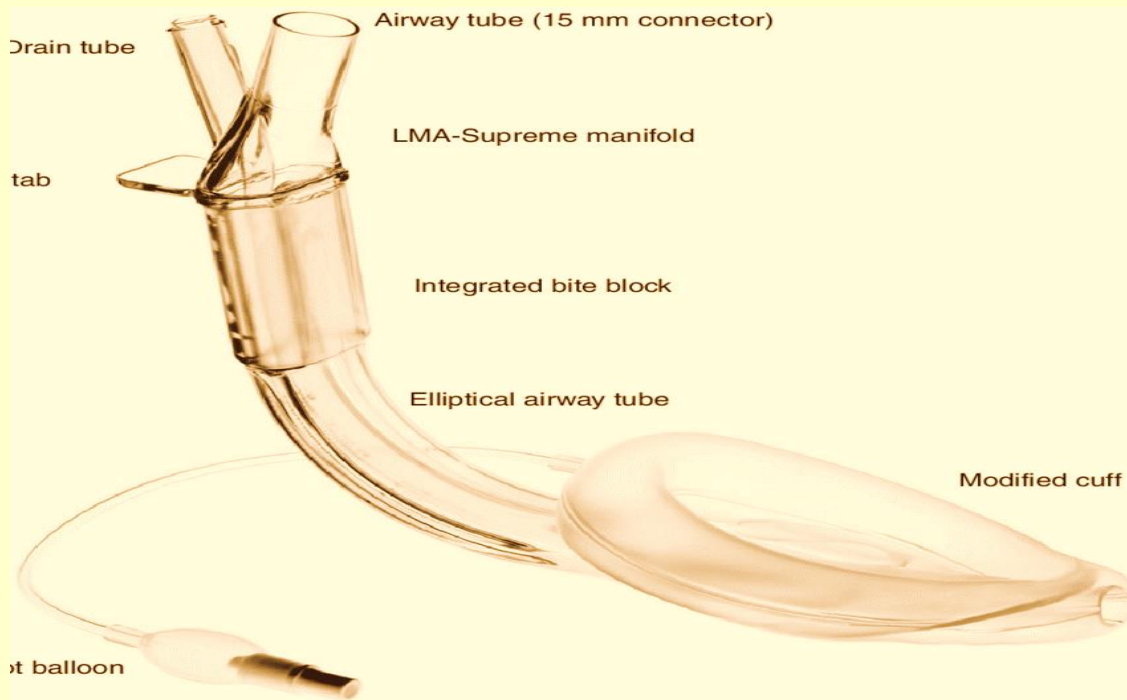


图 4. Supreme 喉罩解剖

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麻醉医生的义举

转发八点健闻

捐款一个亿的医生，和他所倡导的规培制度

张宇琦、陈鑫 撰稿
李珊珊、徐卓君 责编



刘进 教授

在中国，医生通常不认为是个高收入的职业，但就在前天，一个医生捐款 1 个亿的故事，上了热搜。

捐款的医生是华西医院麻醉手术中心主任刘进，而他捐的这 1 个亿是来自科研成果转化，这笔钱将用于在华西医院设立专项规培奖励和发展基金，用于表彰奖励华西医院优秀的在训住院医师、优秀的临床老师、优秀的二级临床学科，以及支持住院医师规培工作的国际交流。因为医学院毕业生接受住院医师规范化培训是一个需要付出巨大努力的艰辛过程，临床老师们的带教也需要高超的医术和极大智慧与担当。刘进认为，他们中的优秀者理应获得表彰和奖励！表彰优秀的住院医师，就是鼓励所有的住院医师向他们学习看齐，努力受训并都能成长为合格的临床医师。也是鼓励优秀的住院医师们今后能成长为优秀的临床大师，医师科学家，医师教学家和医师背景的管理专家。

捐款的决定并不是突然做出的

2021 年 8 月 13 日，在刘进 65 岁生日的前一天，他就已经决定将研发麻醉新药科研转化的个人所得 1 亿元捐赠给华西。一位华西工作人员回忆，在多场领导出席的会议中，刘进都曾提及，以后有钱了，就拿来发展规培。实际上，在他担任人大代表的十年里，一直在推动和倡导着规培制度。

在西南地区乃至全国，华西的领先地位不言而喻，但华西的麻醉科，更是连续 11 年在

复旦大学医院管理研究所的《中国医院最佳专科综合榜》排名全国第一。华西医院副院长曾勇对八点健闻表示，刘进将华西麻醉科从中等水平的科室带到了全球前列，是医院引进的优秀人才中非常突出的一位。

而刘进本人，是中国第一位临床麻醉学博士，也是中国医师协会麻醉学医师分会首任会长。20年来，他所在的麻醉科专业基地已经培养出了约全国5%的青年麻醉医师。约20%的麻醉科主任在华西医院麻醉科接受过短期的管理培训。

走在医院里，这个身高1米6出头、眉毛弯弯、头发微卷的小老头，也许不容易在来往人群中引起注意，只有熟悉他的人才会上晓这位华西麻醉掌门人的非凡事迹。

麻醉圈里的华西，有着“天下第一麻”的江湖称号。学生眼中的刘进，是一个工作上严厉、生活上随和、如同“老父亲”般的角色。同事眼中的刘进，是一个对医疗质量安全把控到极致的人，礼貌平和待人，称呼所有同事都是某某医生。

倘若在科学家和医生的角色里非选其一，刘进更像是一位科学家，沉浸在那些美妙的科研谜题里。但同时，作为医学团队的将帅，他深知医学团队发展，尤其是年轻医生培养对于团队的重要意义，无论是临床、科研，还是教学。

如果说科研成果像一座座沉睡的火山，沉默却蕴含巨大能量。刘进，就是那个让火山爆发的人。全国17%有自主知识产权麻醉新药，由刘进教授团队发明。1类新药磷丙泊酚二钠，已获批新药证书并上市；2.1类新药异氟烷注射液，已完成III期临床试验，正在申请新药证书。1类新药ET-26也已完成了I期临床试验。

一个麻醉医生的近水楼台

某种程度上，刘进的大量发明，也许正是源于，他是一个麻醉科医生。

麻醉科也的确是个特别的科室。手术中病人在生死的边缘游走，而麻醉药物和技术的改进直接决定着手术安全性的提高。如刘进在一次采访中所说，“许多关于救命的技术，比如胸外心脏按压术和心肺复苏术都是麻醉科医师发明的。”

不夸张地说，刘进四十年的麻醉科生涯，也是一个发明家的进阶之路。

刘进这次捐出的1亿元来自于他带领华西医院团队研发的多种麻醉新药，如“YJJS-71新型骨骼肌松弛药物”和“超长效局麻药LL-50”的成功转化。但他对麻醉药物和麻醉系统的研究，早在80年代中期就已开始。

据此前报道，刘进在1984年就开始进行吸入式麻醉研究，那时他刚考入中国医学科学院阜外医院的研究生。在当时的中国，吸入麻醉药普遍价格较高，主要依赖于进口，加之基础研究、设备、资金等多方面的局限，吸入式全身麻醉也还未在全国普及。

1989年，刘进前往美国加州大学旧金山医学院做博士后研究，导师艾德蒙·埃戈尔(Edmond Eger II)教授正是现代吸入麻醉学的重要开拓者。

自1994年回国后，刘进持续投入到麻醉药物机理的研究中。2004年，他带领团队完成了二十多年来世界最大的关于吸入麻醉药溶解度的研究，这些研究还获得了国家科技二

等奖。

2003年，华西医院麻醉团队研发的乳化异氟醚成为第一个成功转化的创新药。在今年的全球生物医药前沿技术大会上，根据刘进介绍，过去的十几年，一系列以临床需求为方向的研究在中国市场实现转化8.17亿元人民币，并且正在探索国际市场的转化。

某种程度上，作为麻醉科医生的刘进成为中国住院医师规范化培训制度的主要推动者，并不是偶然。

在大众眼中，麻醉就是“给一针，睡一觉”，但麻醉其实并不简单，而且风险极高。手术台上瞬息万变，进入抑制状态的病人就像游走在生死边缘，而麻醉医生的任务是时刻监测病人全面的身体状况，并及时做出反应和处理。这就要求，麻醉医生掌握普遍的知识，经历不同科室的轮转培训。

一位麻醉医生指出，麻醉科是一个特别能够受益于规范化培训的专业，能够快速提高临床安全管理水平，是改善医疗服务质量最大的一个突破口之一。

1997年，刘进到华西医院讲学，与石应康结识。刘进向石应康讲述了关于医生职业技能训练的住院医师培养的理念，希望找一家综合性医院作为试点基地，石应康表示非常欢迎。

2000年，刘进把家搬到了成都，正式担任四川大学华西医院麻醉科和ICU主任。

据一位工作人员回忆，过去的华西麻醉科是个业务成绩不算突出的“中等学科”。但在2010年，华西医院麻醉科登上复旦大学医院管理研究所公布的（中国最权威的医院排行榜）专科榜第一，并蝉联至今。

根据华西医院曾公布的数据，2000年华西麻醉科接受规培的医师比例为0%，麻醉死亡率为万分之一，到2010年左右，接受规培的医师比例上升到40%，麻醉死亡率为20万分之一。而从2014年至今，华西麻醉科共实施各种麻醉160余万例，麻醉死亡率小于100万分之一，达到世界领先水平。

夙呈医生集团创始人陈淑君毕业时，规培制度还没普及。“我们当时在实习期会在临床各科室进行轮转，但时间比较短暂，各科室可能只是学到一些皮毛。现在规范化培训有三年的时间，医生可以对各科室有一个详细的了解，这是很好的一个优势。”根据他的观察，过去，一个毕业生要成长为独当一面、具有为复杂病例提出系统麻醉方案的医生，大概需要5到8年时间，而规培制度为临床医师的成长奠定了坚实的基础。

规培，坚持了20年的自认为“正确的事”

2003年-2013年担任全国人大代表期间，刘进连续十年提出“建立国家住院医师规范化培训制度，并将其费用纳入国家财政预算”的议案和建议，最终于2013年被国家采纳并在全国实施。

也许，这份坚持来源于他的导师徐守春。出国学习之前，导师就告诉刘进：“出国学习不要陷入对一两个课题的研究中，要多花时间去了解为什么美国的临床医学比我们做得好。”

而住院医师规范化培训，也许便是刘进心目中，自己找到的解药。他曾经说，“住院医师规范化培训是合格临床医生成长的高效之路，也是提高基层医疗服务质量的治本之策。”

在过去的很长一段时间里，中国的医院，医生水平参差不齐的情况非常严重。到了2008年，还有三甲医院的医生抱怨，“很多从外院来的病人，多数是因为诊断不明或者治疗不当，很多人的损失还是很严重的”。即使对一些常见病和多发病，医生的诊疗也是差别巨大，一次小感冒跑去大三甲的情况也被认为是“出于谨慎”的合理选择。

刘进和他那一代的海归医生则发现，中国的医学生教育在校期间并不比国外差，输是输在了毕业后的再教育。

“合格的医学院毕业生只是‘毛坯’，实施规培的意义在于要把他们培养成能独立行医的合格医生。”

一篇名为《从美国住院医师培训看中国住院医师规范化培训的挑战和方向》的论文指出：“规培制度有望促进公立医院的人事制度改革，医生由单位人变为社会人，为实现医生的自由职业铺平道路”。

当然，更为重要的是：为基层培养合格的“健康守门人”是这项规培制度的根本目的，在更宏观的层面上，规培制度的目标是让临床经验在发展不均衡的区域之间流动。刘进认为，只有建立住院医师规培的国家制度，才能保证所有的医学院毕业生都必须接受三年的住院医师规范化培训，进而能终身规范化行医，从而保证全国人民的常见病和多发病都能得到规范化的诊断、治疗和指导预防。这是提高全中国人民健康卫生水平的基础，是国家的重大需求。

有《人民日报》文章指出：规培更重要的意义是为国家、社会培养合格的临床医生。这些人留在中基层医院，解决常见病、多发病的规范诊治，方便患者就近诊治，有助于实现国家号召的“分级诊疗”，最终解决“看病难”的难题，实现“健康中国2030”的宏伟目标。

2003年，刘进入华西的第三年，华西医院招收了首批社会人身份的规培学员，这些规培医生与医院签订合同，参加包含大量的教学活动和临床实践工作的规范化培训，规培为期五年，学生需在完成这些培训后再寻找工作单位。

可以学到技术，有助于成为一个真正独当一面的医生。然而，高强度的学习和工作，以及不确定的未来，一时间，也令华西的规培在业内获得了“魔鬼培训”的称号。

不仅如此，在本就漫长的医学生阶段之后，又加上一段几乎同样漫长的、低收入、又几乎没有保障的规培生阶段。规培，又成了一个让未来的青年医生们望而生畏的拦路虎。

网络上，医生圈子里，规培的意义，乃至存废的讨论总能吸引大量的参与和围观。

2004年，在以丁香园论坛的“麻醉疼痛”版，一场“关于刘进教授提倡的麻醉科住院医师培训”的大讨论，在麻醉医生们之中开启了。

一位美国的资深麻醉医生在讨论帖下面评论道：“如果大家都不搞培训，老是停留在学徒式教学，中国麻醉怎么也走不近世界水平。”

在那场规培讨论的最初，讨论只是与所有互联网上键盘高手们之间的大战一样，口沫横飞，没有任何一方能被另一方说服。这样的情况持续了三四年。

2008年，一个来自广西的名叫“Wuyuchao”的吴姓医生在讨论帖的后面提出质疑：“规培后就不会麻死人了？”

规培后又得重找工作，重换地方。“五年后很多本科毕业生已经读完硕博连读拿到博士学位了，而你只有一个住院医培训证……虽说多了个住院医培训证，但（就业）形势却更严峻……”

这一次，这个年轻医生的质疑却收到了刘进的回复，刘进还热情邀请这位后辈，到华西来体验规培。

9月，在整个麻醉疼痛版医生的鼓励下，这位年轻的吴姓医生在华西进行了为期5天的考察，并很认真地撰写和发布了考察日记。

日记的末尾，这位表达了自己对刘进的印象：

“一个精力充沛的人，他中午很多时候基本只吃一点水果，也不午休，他自己的经历丰富，他的大量精力和时间花在他认为是正确的事情上，然而这也不影响他在麻醉学界取得成就。他尊重每一个人，言谈举止流露出儒将风流，有自己的原则，很少计较个人得失，也不在意他人的评论。”

我觉得要评判一个人，首先要了解这个人。我不敢说我十分了解刘主任，但是从我在华西一周的经历来看，刘主任是一个细致入微的人，他不会因为一些并不重要的细节问题而影响大局。我刚开始叫他刘教授，后来我就只叫刘主任，因为他自己说他首先是一名做临床的医生，如果要舍弃，其它的都可以不要，他还是要当一名医生。”

对于规培，这位吴姓医生写到：“目前住院医师培训我不会参加，我已经是主治医师，有需要我会选择进修或者其它的短期培训。但是，如果我现在是本科毕业，我会选择参加住院医培训，至于医院，我会去华西麻醉科。”

他决定捐出一个亿激励规培医生

在这位吴姓医生的日记中，同样提到了刘进对年轻的规培医生们待遇问题的关注，“刘主任每年都在提案把住院医培训的费用纳入到国家财政。”这是因为住院医师规培结业的合格临床医师将是社会公用的人才产品，其培训费用理应由国家承担。

在一篇2016年的新华社报道中亦曾提到：刘进建议将住院医师规培费用纳入国家财政预算，同时参照培训基地所在城市的职工平均收入水平补齐参加规培的一年级住院医师收入，并在此后每年增加10-20%，免除他们的后顾之忧。

“如果一个学医的孩子出来，工资连当地平均水平都达不到，那怎么吸引更多优秀的孩子从事医学？”刘进说：“规培的关键问题还需要解决廉价劳动力问题。”

而这次，在规培经费的问题解决之前，刘进捐出了自己的1个亿设立规培专项基

金，主要用于激励住院医师，带教师资，提高住院医师临床能力等。刘进捐赠给四川大学的华西医院及临床医学院的住院医师规范化培训的工作，是因为我国临床医学院的使命正在发生革命性的变化。这就是，临床医学院为中国社会提供的主要产品不再只是医学院毕业生，而是住院医师规培结业的合格临床医师。

对于，为什么要捐这样大一笔钱，很多相关媒体报道引用了刘进的直接回应：

“1 亿元，不是个小数目。如果把这笔钱用于我们一个小小的普通家庭去度过更为舒适的退休生活，我们认为是一种浪费，而捐赠给住院医师规划培训的事业，更具有社会意义，更能体现我们的人生价值。因此我与夫人商量，做出了这个决定。”

就在 9 月 29 日的早上，很多麻醉医生向八点健闻爆料，多个麻醉医生学术群里流传着微信名为“刘老头”的刘进在老家院子里喂鸡，田地里摘南瓜，山路上开疑似挖掘机的照片，以及，他写给昔日医生同行们的留言：

“这次捐款活动算是我职业生涯的谢幕！今后住院医师规范化培训的制度自有来人完善。

今后我的主要任务就是回湖北恩施的老家，种好花草菜粮，养好鸡鸭猪羊……”

“事了拂衣去，深藏功与名”，这位中国麻醉医生中的顶流，一如武侠小说里的顶尖剑客，完成了他认为正确的工作后，便该是退隐家乡的时候了。数家媒体报道中总结说：之前，他是一个农民背景的医生。之后，他想做一个有医生背景的农民。

注：八点健闻（微信公众号 ID: HealthInsight）致力于为中国医疗健康界从业者提供专业，可信的行业资讯。

CASA 主席-黄建宏教授捐款

最近我们 CASA 主席黄建宏教授宣布将他的部分讲课费共\$600 捐给 CASA。此奖设立给 2021 年度 CASA Bulletin 最佳作者。一等奖： \$300， 二等奖： \$200， 三等奖： \$100. 获奖人将由 CASA Bulletin 编辑部评选。

年初黄建宏教授甫一就任 CASA 主席就计划捐款以感谢大家踊跃向 CASA Bulletin 写稿和投稿。现在他终于“心想事成” 一偿夙愿 。不管是刘进教授的一亿元慷慨捐款还是黄建宏教授的讲课费的捐赠，都体现了我们麻醉人的人心良善和品德高尚。两者的意义相同一致：均是为了麻醉事业的更好发展，麻醉医生的“后继有人”和麻醉知识，理论，技术，麻醉安全管理的蓬勃向前！

盼望大家同行们多写文章，写好文章让我们 CASA Bulletin 有幸发表，以壮声威！

感谢各位作者对 CASA Bulletin 的厚爱，感谢各位审稿人及时给编辑部返回可靠的审稿意见！感谢大家多年来对本期刊的大力支持！



繁枝容易纷纷落，嫩蕊商量细细开。唐 杜甫

摄影：Catherine W. 摄影群



五彩斑斓，奇幻壮美的大峡谷。

Antelope Canyon, AZ.

摄影：汪红 教授 CASA 麻醉医生群

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