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นโยบายและขอบเขตการตีพิมพ์

วารสารฯ มีจุดมุ่งหมายเพื่อนำเสนอความรู้วิชาการทางการแพทย์และสาธารณสุขที่เกี่ยวข้องกับการบาดเจ็บ อุบัติเหตุ ที่ทันสมัยแก่ผู้ปฏิบัติงานทางการแพทย์ที่สนใจในการดูแลผู้ป่วยอุบัติเหตุ ขอบข่ายเนื้อหาของวารสารครอบคลุม ระบบการดูแลผู้ป่วยอุบัติเหตุ, การป้องกันอุบัติเหตุ, การดูแลผู้ป่วยอุบัติเหตุก่อนถึงโรงพยาบาล, การกู้ชีพผู้ป่วยอุบัติเหตุ, การผ่าตัดทางศัลยศาสตร์อุบัติเหตุ, การดูแลผู้ป่วยวิกฤติ, การติดตามดูแลรักษาผู้ป่วยต่อเนื่อง, แพทยศาสตร์ศึกษาทางศัลยศาสตร์อุบัติเหตุ, งานวิจัยวิทยาศาสตร์พื้นฐานทางศัลยศาสตร์อุบัติเหตุ

การเตรียมต้นฉบับ

1. บทความทุกประเภทจะเขียนเป็นภาษาไทยหรือภาษาอังกฤษก็ได้
2. การเตรียมต้นฉบับ ให้พิมพ์ด้วยโปรแกรม MSWord Angsana new หรือ upc ขนาด 14 pt, double space ประกอบด้วยส่วนต่าง ๆ ดังนี้ คือ ชื่อเรื่อง ชื่อเรื่องย่อ ผู้วิจัย สถานที่ทำงานของผู้วิจัย บทคัดย่อ Keywords เนื้อเรื่อง กิตติกรรมประกาศ เอกสารอ้างอิง ตารางและหรือรูปแสดง
3. ชื่อเรื่อง ชื่อผู้วิจัย และบทคัดย่อ ต้องมีทั้งภาษาไทย และภาษาอังกฤษ
4. การเขียนเอกสารอ้างอิง ใช้ระบบ Vancouver ใส่หมายเลขเรียงลำดับที่อ้างอิงภายในเรื่องการย่อชื่อวารสาร ใช้ตาม index medicus

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สารจากนายกสมาคมแพทย์อุบัติเหตุแห่งประเทศไทย

สวัสดีครับท่านสมาชิก และบุคลากรทางการแพทย์ วารสารอุบัติเหตุ ของสมาคมฯ ฉบับนี้เป็นวารสารฉบับที่เผยแพร่ในรูปแบบ Online เป็นฉบับแรก เป็นฉบับที่ 1 ของปี 2568 (มกราคม-มิถุนายน) ซึ่งในฉบับนี้มีเนื้อหาที่น่าสนใจด้านอุบัติเหตุในสถานการณ์แพร่ระบาดของCOVID-19 ที่ผ่านมาในหัวข้อ

Road-traffic injuries (RTIs) resulting early death at the emergency room in Khon Kaen hospital in COVID-19 pandemic: a descriptive study ซึ่งเป็นผลงานวิจัยจากโรงพยาบาลขอนแก่น และในวารสารฉบับนี้ ยังมี Case Report ที่มีเนื้อหาที่น่าสนใจมากในเรื่อง A scarless approach to mitigate external wound complications in Nasomaxillary fracture patients.: Case report ซึ่งเป็นเรื่องที่น่าจะเป็นประโยชน์ต่อท่านสมาชิก นอกจากนี้เช่นเคยในวารสารฉบับนี้ยังมีเรื่องวิชาการในบทความ A case report of the trauma patient who has complex abdominal wall reconstruction by using the posterior component separation with transversus abdominis release technique เป็นตัวอย่างกรณีศึกษาที่น่าสนใจและน่าจะมีประโยชน์มากต่อท่านสมาชิก

และผมขอประชาสัมพันธ์เชิญชวนสมาชิกเข้าร่วมประชุมวิชาการอีกรายการหนึ่งที่ใกล้จะถึงนี้ โดยสมาคมแพทย์อุบัติเหตุแห่งประเทศไทย ร่วมกับโรงพยาบาลมหาราชานครศรีธรรมราช จัดประชุมวิชาการส่วนภูมิภาค ประจำปี 2568 ในรูปแบบ Onsite ในหัวข้อ “FUTURE TRENDS IN TRAUMA CARE ” วันที่ 18 – 20 สิงหาคม พ.ศ.2568 โรงแรม Grand Fortune จังหวัดนครศรีธรรมราช มีเนื้อเรื่องที่น่าสนใจมากมาย ในด้าน Update และ FUTURE TRENDS ในการดูแลผู้ป่วยบาดเจ็บในด้านต่างๆ อยากขอเชิญท่านสมาชิก และบุคลากรทางการแพทย์ทุกท่าน เข้าร่วมประชุมวิชาการครั้งนี้ครับ

สมาชิกและผู้สนใจทุกท่านสามารถติดตามรายละเอียด ข่าวสารของทางสมาคม และเนื้อหาวิชาการ อีกช่องทาง โดยสามารถติดตามทาง www.traumathailand.or.th และ Facebook ของสมาคมแพทย์อุบัติเหตุแห่งประเทศไทย

ด้วยความเคารพ

ผู้ช่วยศาสตราจารย์ นายแพทย์ธีระชัย อุกฤษณ์โนรธ
นายกสมาคมแพทย์อุบัติเหตุแห่งประเทศไทย

บทบรรณาธิการ

เรียนท่านสมาชิกและบุคลากรทางสาธารณสุขทุกท่าน

วารสารอุบัติเหตุของสมาคมแพทย์อุบัติเหตุแห่งประเทศไทยฉบับนี้เป็นปีที่ 44 ของวารสารฯ ในฉบับนี้ประกอบด้วยงานวิจัย A scarless approach to mitigate external wound complications in Nasomaxillary fracture patients.: Case report เป็นการนำเสนอแนวทางการรักษาผู้ป่วยกระดูกใบหน้าหักที่น่าสนใจ ซึ่งผู้ป่วยที่มีกระดูกใบหน้าหักนั้นพบได้บ่อยในผู้ป่วยศัลยกรรมอุบัติเหตุ โดยศัลยแพทย์สามารถนำวิธีการรักษานี้ไปประยุกต์ใช้กับผู้ป่วยกระดูกใบหน้าหักของตนเองได้ นอกจากนี้ยังมีบทความ Road Traffic Injuries (RTIs) Resulting in Early Death in the Emergency Room at Khon Kaen Hospital During the COVID-19 Pandemic: A Descriptive Study ซึ่งเป็นการนำเสนอข้อมูลผู้ป่วยจากอุบัติเหตุจราจรที่น่าสนใจในช่วงการระบาดของโรค Covid-19 และสุดท้ายมีการนำเสนอวิธีการผ่าตัดที่น่าสนใจในบทความเรื่อง A case report of the trauma patient who has complex abdominal wall reconstruction by using the posterior component separation with transversus abdominis release technique นับเป็นอีกหนึ่งวิธีการผ่าตัด ที่สามารถนำไปประยุกต์ใช้กับผู้ป่วยทางศัลยกรรมอุบัติเหตุรายอื่นได้ในอนาคต

ทางกองบรรณาธิการหวังเป็นอย่างยิ่งว่า วารสารอุบัติเหตุฉบับนี้จะเป็นประโยชน์แก่ท่านสมาชิกและผู้สนใจทุกท่าน และหวังว่าจะได้รับความร่วมมือจากทุกสาขาวิชาชีพในการแบ่งปันบทความ และผลงานวิจัยมาตีพิมพ์เผยแพร่ความรู้ เพื่อพัฒนาการดูแลผู้ป่วยอุบัติเหตุที่ดีขึ้นในโอกาสต่อไป

กองบรรณาธิการ

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A scarless approach to mitigate external wound complications in Nasomaxillary fracture patients: Case report

Pisit Akarapornpat, M.D.¹ and Chidpong Siritongthaworn, M.D.²

ABSTRACT

Nasomaxillary fractures, which involve the nasal bone, maxillary frontal process, and anterior maxilla, present both cosmetic and functional difficulties due to their central anatomical location and vulnerability to injury. Conventional method, subciliary incision, may lead to negative outcomes including scarring, dyspigmentation, and ectropion. To mitigate these issues, we utilize closed endonasal reduction with fixation of the nasal bone to the maxilla employing a straight instrument through the gingivobuccal approach, ensuring proper anatomical alignment while safeguarding the infraorbital nerve, thus enhancing results for patients who have risk factors like poor wound healing or Fitzpatrick skin type V.

Postoperative evaluations revealed a successful restoration of nasal shape, airflow, and patient satisfaction without any visible external scarring. This method underscores the importance of customized surgical planning, particularly for patients with a higher risk of scarring, and demonstrates the effectiveness of the straight instrument gingivobuccal approach as an alternative to traditional technique.

บทคัดย่อ

กระดูกโหนกแก้มและจมูกหัก (Nasomaxillary fractures) โดยนิยามคือการหักของกระดูกจมูก (Nasal bone) กระดูกโหนกแก้มข้างจมูก (Maxillary frontal process) และกระดูกโหนกแก้มด้านหน้า (Anterior maxilla) เนื่องจากตำแหน่งทางกายวิภาคของกระดูกส่วนดังกล่าวอยู่ตรงกลางใบหน้า และมีความเปราะบาง เมื่อเกิดการหักย่อมส่งผลกระทบต่อผู้ป่วยทั้งด้านความสวยงามและการหายใจ

วิธีการลงแผลเพื่อรักษาแบบดั้งเดิม เช่น การลงแผลใต้ตา (Subciliary incision) อาจส่งผลเสียต่อผู้ป่วย เช่น การเกิดแผลเป็น (Surgical scar) การเกิดสีผิวบริเวณแผลไม่สม่ำเสมอ (Dyspigmentation)

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และภาวะหนังตาล่างปลิ้น (Ectropion) เพื่อหลีกเลี่ยงปัญหาเหล่านี้ ศัลยแพทย์สามารถใช้การจัดกระดูกกลับผ่านทางรูจมูก (Closed endonasal reduction) พร้อมกับการยึดกระดูกที่หักเข้าด้วยกัน (Internal fixation) โดยใช้อุปกรณ์ยึดตรึงแบบตรง (Straight instrument) โดยลงแผลระหว่างรอยต่อระหว่างเหงือกและเยื่อช่องปาก (Gingivobuccal approach) ซึ่งวิธีการดังกล่าวสามารถช่วยรักษาแนวกระดูกให้ถูกต้องตามกายวิภาคเดิมได้ พร้อมทั้งป้องกันไม่ให้เกิดการบาดเจ็บต่อเส้นประสาทใต้เบ้าตา (infraorbital nerve) เมื่อผ่าตัดอย่างระมัดระวัง อีกทั้งยังทำให้เกิดผลลัพธ์ที่ดีโดยเฉพาะผู้ป่วยที่มีความเสี่ยงต่อการเกิดแผลเป็น เช่น มีประวัติแผลเป็นมาก่อน หรือผิวหนังคล้ำประเภท Fitzpatrick ชนิดที่ 5 (Fitzpatrick skin type V)

การประเมินหลังการผ่าตัดแสดงให้เห็นว่ารูปรูปร่างจมูก การหายใจ และความพึงพอใจของผู้ป่วยนั้นได้ผลลัพธ์ที่ดีเยี่ยม โดยไม่มีรอยแผลเป็นที่มองเห็นได้จากภายนอก วิธีนี้จึงแสดงให้เห็นถึงความสำคัญของการวางแผนการผ่าตัดที่ปรับให้เหมาะสมกับผู้ป่วยแต่ละราย โดยเฉพาะผู้ป่วยที่มีความเสี่ยงต่อการเกิดแผลเป็นสูง และแสดงให้เห็นถึงประสิทธิภาพของการลงแผลระหว่างรอยต่อระหว่างเหงือกและเยื่อช่องปาก (Gingivobuccal approach) แบบใช้อุปกรณ์แบบตรงในห้องผ่าตัด โดยเฉพาะในห้องผ่าตัดที่ไม่มีอุปกรณ์ผ่าตัดยึดตรึงแบบคိုင်งอ เพื่อเป็นหนึ่งในทางเลือกที่มีประสิทธิภาพในการรักษาผู้ป่วย

KEYWORDS

fracture, nasal, nose, treatment, approach, intraoral

INTRODUCTION

The nose, centrally situated on the face, is paramount in facial aesthetics and functional integrity. Its prominent anatomical position and thinner structure below the intercanthal line render the nasal bone susceptible to traumatic injury, hence justifying its status as the most frequently fractured facial bone.¹⁻⁵

Nasal fracture can be limited to the nasal bone alone or involved different components of the surrounding region.⁶ Certain efforts have been made to categorize various types of nasal bone fractures according to fracture patterns or the severity of injury. Nevertheless, Siriraj Hospital adopts a classification system based on treatment approaches, namely: nasonasal fracture, nasomaxillary fracture, and nasoorbitoethmoidal fracture.

The diagnosis of a nasomaxillary fracture was deemed appropriate when the fracture implicated the nasal bones, the maxillary frontal process, the anterior aspect of the maxilla, and the canine pillar, while excluding avulsion of the medial canthal tendon and medial wall of orbit.⁶

The primary treatment approach for nasomaxillary fracture involves closed endonasal reduction, with the goal of restoring the original anatomical alignment of the nasal bone. Subsequent to reduction, stabilization of the nasal bone to the maxillary bone is accomplished through the application of plates and screws. Traditional techniques typically employ a subciliary incision for fixation, which can result in undesirable outcomes including but not limited to scarring, changes in skin pigmentation, injury to lacrimal system and, ectropion.^{7,8} To mitigate these complications, our approach utilizes a gingivobuccal sulcus approach, selected to minimize adverse effects.

CASE

A 37-year-old American male presents at Siriraj Hospital with a complaint of epistaxis originating from the right nasal cavity subsequent to physical assault by a punch.

The patient reported a history of being physically assaulted the night before presenting to the hospital. Following the assault, he experienced left-sided nasal pain and bleeding from the left nostril. He also complained of left nasal congestion but denied any numbness in the facial area. On examination, the patient had a normal visual field with no diplopia. He has normal vision without any double vision. He recalls the incident well, without experiencing dizziness or other areas of pain.

The patient, with no known underlying medical conditions, drug allergies, or history of anticoagulant or NSAID use, presented with a history of poor wound healing.

On physical examination, he was alert, cooperative, and afebrile, with stable vital signs (blood pressure 144/83 mmHg, heart rate 71 beats per minute, respiratory rate 18 breaths per minute, temperature 37°C) and Fitzpatrick skin type V.

The head and scalp were normal in shape and size, without external wounds. Ocular assessment revealed full extraocular movements with no diplopia, subconjunctival hemorrhage, periorbital ecchymosis, or orbital rim step-offs. Nasal examination demonstrated depression and tenderness over the left nasal bone and sidewall, mild contusion, decreased airflow on the left, swollen left nasal mucosa, and rightward septal deviation, without active epistaxis or infraorbital nerve hypoesthesia (*Figure 1A, 1B*). The oral cavity and pharynx were intact, with no evidence of bleeding or dental trauma. Neck examination showed no swelling, tenderness, or external lesions.



Figure 1A
shows a frontal view of the patient.



Figure 1B
shows an overhead view of the patient.

Computed tomography (CT) scan Facial bone, 3 Dimension (3D) CT Facial bone:

There is a displaced fracture involving the nasal bone extending to the frontal process of the maxilla bone. There are no fractures observed at the ethmoid bone, nasal septum, or medial wall of the orbit. (Figure 2A-2D)



Figure 2A- displays an axial view of the CT scan.



Figure 2B- displays a coronal view of the CT scan.

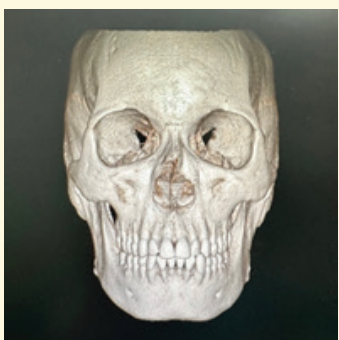


Figure 2C- displays a 3-D CT scan. (Frontal view)



Figure 2D- displays a 3-D CT scan. (Basal view)

TREATMENT

Following the incident, the patient sought medical attention at Siriraj Hospital on February 21st, 2024. Thereafter, we scheduled the surgical intervention for endonasal reduction with open reduction and internal fixation (ORIF) employing plates and screws via the gingivobuccal sulcus approach on February 22nd, 2024.

Presented below is a detailed description of the surgical procedure.

1. The patient was placed in the supine position.

2. Following sedation under general anesthesia, Endotracheal tube No. 7 was inserted and secured on the site opposite to the fracture.

3. The patient's face was prepped and draped with sterile surgical cloth.

4. 0.2% sterile carbomer gel was applied to the patient's conjunctiva to protect the cornea.

5. A 0.5% chlorhexidine gluconate in sterile water was applied around the patient's face to sterilize the surgical area prior to the procedure.

6. 1% lidocaine with adrenaline was infiltrated into the left upper gingivobuccal sulcus.

7. Nasal cleansing was performed using gauze soaked in 70% alcohol.

8. Nasal packing was inserted into the right nostril to provide support to the nasal pyramidal structure. Subsequently, nasal packing with gauze was utilized to elevate the depressed frontal process of the maxillary fracture site to its original position.

9. A left upper vestibular incision was made between the canine and 2nd premolar using blade No.15, approximately 2 mm above the gingivobuccal sulcus to preserve the mucosal flap. (Figure 3)

10. A tunnel was created by dissecting upward along the piriform aperture in the subperiosteal plane while preserving the nasal mucosa. A navy-army retractor was utilized to assist in elevating the surgical plane.

11. The fracture site and the depressed frontal process of the maxillary fragment were visualized (*Figure 4*).

12. A titanium 2.0 miniplate was bent to properly fit the frontal process of the maxillary bone and nasal bone.

13. A straight drill was used to create a hole (1 hole on the nasal bone, 2 holes on the frontal process of the maxillary bone).

14. A straight screwdriver was used to insert and secure a screw in its position.

15. Satisfactory contour was achieved.

16. The nasal packing at the nostrils was removed before further reducing the nasal septum.

17. Closed reduction of the nasal bone was accomplished using a Boies periosteal elevator.

18. Septal correction was performed utilizing a Boies periosteal elevator.

19. Bilateral insertion of manufactured sponge nasal packing was carried out to control bleeding and provide support to the nasal pyramid structure.

20. Bleeding in the pre-nasal area was evaluated, and no hemorrhage was detected.

21. Bleeding in the intraoral area was evaluated and addressed by irrigation with 0.9% normal saline solution.

22. The intraoral wound was meticulously sutured with fast-absorbing coated polyglactin 910 size 4-0.

23. A thin application of tincture benzoin was administered around the nose and forehead to facilitate the adherence of tape and the aluminum splint.

24. An external aluminum splint was meticulously applied and secured in place with tape.

25. The patient was extubated and transferred to the recovery room in a stable condition.



Figure 3- shows a gingivobuccal incision for approaching the fracture site.



Figure 4- The left panel illustrates a depressed fracture of the frontal process of the left maxilla. The right panel depicts the postoperative outcome following plate and screw fixation, showing proper alignment between the frontal process of the maxilla and the nasal bone without any visible step-off.

During the follow-up visit, one week later, the patient reported a favorable outcome. He experienced normal nasal breathing and remained free from epistaxis. Following the removal of the aluminum splint, the nasal shape had fully returned to its pre-injury state. Then, we reassured the patient by conducting a Waters' view X-ray to confirm that the plate and screws are in their desired positions. (Figure 5)

Following the surgical procedure, a one-month postoperative follow-up was conducted with the patient. No external deformities were observed. Bilateral airflow symmetry was confirmed, and olfactory function was found to be intact. No septal deviation was detected. The patient reported satisfaction with the aesthetic and functional outcomes of the nasal surgery. (Figure 6)

DISCUSSION

Nasal bone fracture represents the most common facial fracture and are frequently encountered in emergency departments. This prevalence is primarily attributable to the prominent, midline positioning, and thin nature of the bone. This anatomical characteristic renders it particularly vulnerable to injury upon external force impact directed towards the facial region. Injuries to the nasal bone are categorized into three types according to the treatment principles of Siriraj Hospital, where the treatment approach varies for each type of injury.



Figure 5- shows that the plate and screws are in their desired positions.



Figure 6- shows the condition one-month post-surgery.

For nasomaxillary fracture, which involve not only the nasal bone but also the maxillary frontal process, inferior orbital rim, anterior part of the maxilla, and canine pillar, surgical intervention is necessary.⁹

In addition to reducing the nasal bone, surgery is required to stabilize it with the frontal process of the maxilla. This is necessary to prevent the collapse of the nasal bone, which can lead to significant deformities and obstruction of nasal airflow.

Following systematic data collection at the Facial Fracture Clinic of Siriraj Hospital (Trauma center level1) spanning from January 1, 2018, to December 31, 2020, and subsequent exclusion of nasal fractures with concomitant fractures such as Le Fort II fractures, zygomaticomaxillary complex fracture, fracture of maxillary antrum, a total of 251 cases of isolated nasal bone fractures were identified. Among these cases, 227 (90.4%) involved isolated Nasonasal bone fractures, 20 (8%) involved isolated Nasomaxillary bone fractures, and 4 (1.6%) involved isolated Nasoorbitoethmoidal bone fractures.

Nasomaxillary fracture results from an impact at a lower and more lateral site, at the junction of the nasal bone, inferior orbital rim, and nasomaxillary buttress. At this site, the thicker bone requires a higher energy trauma to fracture compared to the nasal bone.⁶ Patients with nasomaxillary bone fracture may exhibit signs and symptoms shared with other types of nasal bone fracture, including but not limited to epistaxis, nasal obstruction, tenderness at the fracture site, or palpable step-off deformity.

However, an additional sign of nasomaxillary fracture includes a step-off and tenderness at the base of the nasal sidewall (frontal process of the maxilla). Misdiagnosis resulting in failure to properly realign the fracture site can indeed lead to long-term complications, including external nasal deformity and nasal airflow obstruction.

While the diagnosis of nasal bone fracture can be primarily made through physical examination, it is common practice to utilize plain film imaging to confirm the diagnosis. The most commonly used plain films to confirm the diagnosis of nasal bone fracture are the lateral nasal view and the Waters' view. Although the plain film lateral nasal view is commonly utilized to confirm a nasal bone fracture, this imaging modality provides only a two-dimensional image, which may not always be sufficient for accurate diagnosis. Additionally, plain film alone is insufficient for distinguishing between nasonasal and nasomaxillary fracture and may not provide useful guidance for treatment decisions. In contrast, J.adnot et al.⁶ has described that the Waters' view can depict not only a nasal bone fracture characterized by an interruption in the contour of the piriform aperture, but also two additional findings. These include an air-fluid level in the sinus, indicative of the presence of blood, which is consistently observed in patients with nasomaxillary fracture. Another significant finding is the loss of continuity of the McGregor–Campbell line, which is not discernible on other views.

These findings raise suspicion for a nasomaxillary fracture and, consequently, prompt the need for a CT scan. However, in cases involving more severe trauma and when physical evidence of other facial fractures is present, CT scan should be used to assess the extent of bony injury.¹

ORIF is considered the gold standard for treating nasal bone fractures involving the maxilla. The selection of a surgical approach may vary depending on the specific advantages and disadvantages of each technique. Common options include the more favorable lower eyelid incisions—such as the subciliary or transconjunctival approaches—or the less commonly used gingivobuccal sulcus incision.

In Thai patients, the subciliary approach is often preferred to minimize visible scarring, as it is located near the fracture site and offers a relatively sterile operative field compared to the gingivobuccal approach. However, this method carries risks of potential complications, including ectropion, lagophthalmos, injury to the lacrimal system, and noticeable scarring.

Although the transconjunctival approach is also more sterile than the gingivobuccal route for nasomaxillary fractures, it poses technical challenges.

CONCLUSION

In patients with nasomaxillary fractures who are at risk of complications related to skin incisions, such as those with a history of poor wound healing or susceptibility to surgical scarring, fixation of the nasal bone with the maxilla via the gingivobuccal approach using straight instruments can be considered. Although utilizing straight instruments for plate fixation may present challenges, meticulous dissection and careful elevation of the cheek flap, while preserving the infraorbital nerve, can significantly enhance the visual field and contribute to a successful operation.

These include limited surgical exposure and greater distance from the fracture site, which can hinder effective fracture reduction.

In this case, the patient—a Fitzpatrick skin type V American man with a history of unfavorable scarring—prompted a strategic decision to mitigate potential complications associated with external scarring. Recognizing the risk of ectropion consequent to scarring along the lower lid margin, we opted for the gingivobuccal sulcus approach to minimize the likelihood of this adverse outcome. Despite the potential distance between the incision and fracture site, careful dissection along the surgical plane and creation of a sizable tunnel for clear visualization facilitate the use of straight drill and screwdriver for plate and screw fixation after repositioning the fractured bone, while preserving the infraorbital nerve. Although utilizing straight instruments poses increased difficulty, especially without angled alternatives, this procedure remains feasible, particularly when visualization is optimal.

In general, fixation of the nasal bone and frontal process of the maxilla typically employs 1.5 mm plates. However, 2.0 mm plate were utilized in this patient due to the unavailability of 1.5 mm miniplate in the facial fracture's equipment set of Siriraj Hospital.

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Road Traffic Injuries (RTIs) Resulting in Early Death in the Emergency Room at Khon Kaen Hospital During the COVID-19 Pandemic: A Descriptive Study

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ABSTRACT

Objectives: To define the epidemiologic characteristics and results of early RTI death during COVID-19 era

Methods: This retrospective, descriptive study was conducted from Khon Kaen hospital injury surveillance (IS) online trauma registry during 2018 and 2022. The inclusion criteria were victims who survived from scene and were sent to emergency room (ER) and died at ER.

Results: There were 99 total death. Most common vehicle crash was motorcycles (82.95%). Scene time was 41 minutes.

Conclusions: COVID-19 era affects in gradually increasing scene time
Keywords for indexing: road-traffic injuries, early death, emergency room, transfer, COVID-19

KEYWORDS

road-traffic injuries, early death, emergency room, transfer, COVID-19

INTRODUCTION

Road-traffic injuries (RTIs) has been one of the leading causes of death around the world especially in working age (1). It results in socioeconomic burden even up to one-year post traumatic events (2). Thailand has been one of the world's highest death among road users (3). This impact the national financial status.

The coronavirus disease 2019 (COVID-19) pandemic that emerged during these years has brought challenges to global healthcare system including emergency response services and outcomes of emergency cares. Prevention program was also disrupted (4). In Thailand, the COVID-19 pandemic was defined by the year of 2020(5).

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RTI prevention and post-crash response management were also interfered. Interestingly, it has declined in number of acute trauma referral and admission (6). However, outcomes of the RTIs victims during COVID-19 era is unknown in Southeast Asian countries with high demands of motorcycle use (7). This study aimed to explore the effect of COVID-19 pandemic to emergency medical service (EMS) response to RTI victims by assessing death from RTIs at emergency room (ER).

METHODS

This descriptive study was retrospectively review from Khon Kaen Hospital trauma registry collected via national-and-hospital-based Injury Surveillance (IS) online program. All trauma victims who survived from immediate post-crash death were sent to resuscitation zone at ER, Khon Kaen Hospital from 1st January 2018 to 31st December 2022. The inclusion criteria were all patients who survived from prehospital scene but finally dead at ER. The demographic data including age, sex, common vehicles, and pre-injury risk factors. Total deaths, scene time, and ER time were stratified in years with line graphs. Final diagnosis was made by physical examination and plain chest film. None of them performed further investigations.

Categorical data were described using frequency and percentage and tested using Fisher's exact probability test. Normally distributed continuous data were described using means and standard deviations, and were tested using independent t-tests.

Non-normally distributed continuous data were described using the medians and interquartile ranges.

RESULTS

The data on deaths from RTIs in the emergency room at Khon Kaen Hospital were collected from 1st January 2018 to 31st December 2022. There was a total of 99 deaths. The majority was male (77.3%). The median age was 35 [23, 54] years old. Most common vehicles are motorcycles (82.95%), followed by pickup trucks (6.82%), and sedan (5.68%), respectively. The demographics were shown in (Table 1).

Table 1
The demographic characteristics of the deaths from road-traffic injuries in the ER

Demographic characteristics	Missing data, %	Amount, n (%)
Total deaths	0 (0)	99 (100)
Age, years [Median, IQR]	0 (0)	35 [23, 54]
Male sex, n (%)	18 (18.18)	63 (77.78)
Common vehicles:	11 (11.11)	88 (100)
- Motorcycles	-	73 (82.95)
- Pickup trucks	-	6 (6.82)
- Sedans	-	5 (5.68)
- Others	-	4 (4.56)
ISS [median, IQR]	10 (10.10)	75 [25, 75]
RTS [median, IQR]	14 (14.14)	0 [0, 0]
PS [median, IQR]	21 (21.21)	0.01 [0.00, 0.04]

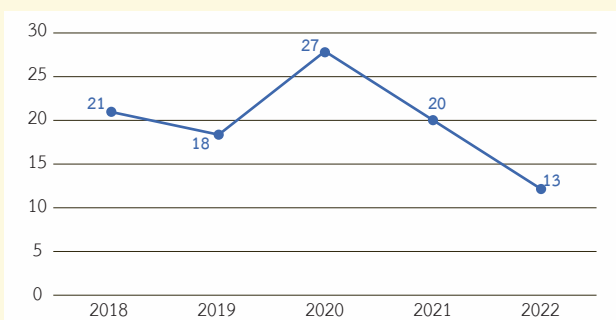
ER = emergency room; IQR = interquartile range; ISS = injury severity score; RTS = revised trauma score; PS = probability of survival

Median injury severity score (ISS) was 75 [25, 75]. Median revised trauma score (RTS) was 0 [0, 0]. Median TRISS probability of survival was 0.01 [0.00, 0.04]. Pre-injury risk factors were alcohol drinking (8.08%), not fastening the seat belts (46.46%), and not wearing the helmet (47.95%). Most significant organ injuries resulting in death at ER were head and neck (69.79%), thorax (18.75%), and abdomen (8.33%), respectively. The injury characteristics were shown in (Table 2).

Table 2*Risk factors and organ-specific injuries characteristics*

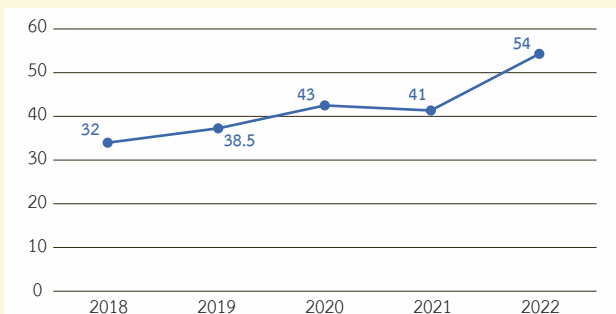
Demographic characteristics	Missing data, %	Amount, n (%)
Pre-injury risk factors:		
- Alcohol drinking	64 (64.65)	8 (8.08)
- Not fastening the seat belts	6 (46.15)	6 (46.15)
- Not wearing the helmets	36 (49.32)	35 (47.95)
Organ-specific injuries resulting in deaths	3 (3.03)	-
- Head and neck	-	(69.79)
- Thorax	-	(18.75)
- Abdomen	-	(8.33)

When the analysis was separated by years, we found that the deaths were 21, 18, 27, 20, 13 deaths, respectively between 2018 and 2022 shown in (Figure 1).

**Figure 1-** Deaths among years

The scene transportation time from accidental occurrence to reach ER door was increased with the median time of 41 [29, 51] minutes. The graph was shown in (Figure 2).

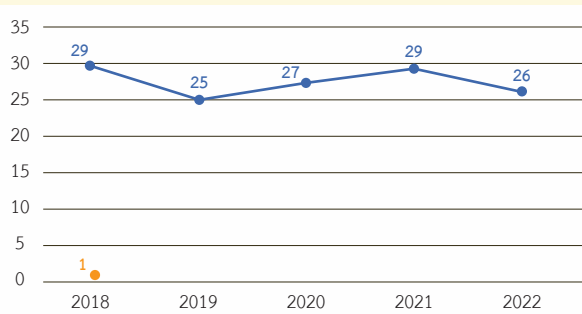
The time spent at ER was not significantly different between years as shown in (Figure 3).

**Figure 2-** The median time from scene transportation to ER (minutes)

DISCUSSION

Thailand has been one of the highest deaths from RTIs. The deaths were still high and problematic despite of declining in number and ranking as the result of active injury prevention program (3). The fatality still impacts gross domestic product. The disability in the survivors also individually causes economic and productivity losses (8).

After survived from the crashes, survivors were sent to the hospitals with basic resuscitation and stabilization (9). Early deaths reflects the local's post-crash emergency response system and the emergency room management quality including how fast the emergency medical services (EMS) can get into the scene, basic stabilization at scene (platinum ten), and how the emergency room personnel can resuscitate the victim (golden hour or golden period) (10). During the COVID-19 pandemic, traffic accident was decreased but the scene time arrival and total rescue time were increased (11,12). This could be from the inconvenience in working with the powered air purifying respirator (PAPR) suites or regional protocol modifications during the pandemic (13). The personnel used national protocol. These findings were concordant with our study. The median time from transportation to ER was gradually increased by years. Surprisingly, the findings did not affect the mortality which was still unpredictable.

**Figure 3-** Time spent at ER (minutes)

The ER time was still favorable with less than 30 minutes spent. The communication with the in-house well-prepared team could be the reason.

The most common vehicle was still the motorcycles for 80 percent as same as the previous years. According to the global market for motorcycles, Thailand has steady demands despite of active injury prevention promotion (7). The most common cause of death was also severe traumatic brain injury. We did not get the safety status from the victims so we could not analyze what the risk factors of death were.

This study is the one that tells us about the effects of COVID-19 era, defined as the year of 2020, in a low-to-middle income and high prevalence of road-traffic injuries country. It shows that despite of the fatal spreading, it does not affect people's daily activities. The study also shows the missing data which facilitates the readers whether the results of the study was acceptable. One of the concerns were why mortality rate still high despite of lock down protocol. The hypothesis was delayed arrival time due to safety inconvenience.

This study also has limitations. From retrospective descriptive in nature, it does not show the power and trend of the outcome. Some missing data were high in proportion. These might lead to selection bias. Lastly, the ISS could not be accurately estimated due to missing in the definite diagnosis. The total score of 75 means nonsurvivable status. If the final ISS was precise, it would tell us how post-crash response systems had some improvements.

According to retrospective study in nature, it is generalizable to other low-to-middle socio-economic regions and should help the policy makers to design the injury prevention program and EMS system for severe trauma patients.

CONCLUSION

There are still some concurrent results during COVID-19 pandemic: total death and epidemiology of early mortality of the road-traffic accident victims. The scene time is gradually increased during years but ER time is still plateau.

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A case report of the trauma patient who has complex abdominal wall reconstruction by using the posterior component separation with transversus abdominis release technique

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ABSTRACT

Posterior component separation with transversus abdominis release is a technique that corrects complex abdominal wall defects. Many studies have proven that it has lower recurrence and surgical site infection rates. This technique has become popular in the large complex ventral hernia reconstruction. There is less data to use this technique in trauma patients who have complex abdominal wall defects. This is a report of the trauma case receiving posterior component separation with transversus abdominis release technique for chronic ventral hernia after blunt abdominal injury with multiple organ trauma. Techniques and procedures are explained, along with relevant literature.

บทคัดย่อ

รายงานเคสผู้ป่วยอุบัติเหตุที่ได้รับแก้ไขการบาดเจ็บผนังหน้าท้องที่ซับซ้อนโดยการแยกส่วนผนังหน้าท้องด้านหลังร่วมกับการปลดกล้ามเนื้อหน้าท้องส่วนขวาง

การผ่าตัดแยกส่วนผนังหน้าท้องส่วนหลังร่วมกับการปลดกล้ามเนื้อหน้าท้องส่วนขวาง เป็นอีกหนึ่งวิธีในการแก้ไขการบาดเจ็บผนังหน้าท้องที่ซับซ้อน มีหลายการศึกษาวิจัยที่พิสูจน์ว่าการรักษาโดยวิธีนี้มีอัตราการเกิดเป็นซ้ำ และการเกิดภาวะติดเชื้อมีตำแหน่งผ่าตัดต่ำ วิธีการผ่าตัดนี้เริ่มได้รับความนิยมในการแก้ไขภาวะไส้เลื่อนหน้าท้องขนาดใหญ่และซับซ้อน

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แต่วิธีนี้ยังถูกนำมาใช้น้อยในผู้ป่วยอุบัติเหตุที่มีปัญหาการบาดเจ็บซับซ้อนที่ผนังหน้าท้อง นี่คือการรายงานการรักษาในผู้ป่วยที่มีภาวะไส้เลื่อนผนังหน้าท้องขนาดใหญ่ชนิดซับซ้อนภายหลังเกิดอุบัติเหตุในช่องท้อง ที่ได้รับการแก้ไขโดยวิธีนี้ มีการอธิบายเทคนิคและขั้นตอนการผ่าตัด รวมทั้งบททบทวนงานวิจัยที่เกี่ยวข้อง

KEYWORDS

PCS/TAR in trauma

CASE REPORT

A 32-year-old male singer had a blunt abdominal injury due to a high-speed car accident one year ago. He had undergone exploratory laparotomy at the first hospital. The findings were as follows: 80% circumferential jejunal tear at 8cm from the DJ junction, 90% circumferential tear at the 2nd and 3rd part of the duodenum, superior mesenteric vein injury, and superficial contusion at the uncinate process of the pancreas (pancreatic injury grade I). He underwent primary repair of the jejunum, duodenum, and the superior mesenteric vein, and a closed suction drain for the pancreatic injury. A few days later, the patient developed sepsis due to leakage of the duodenal anastomosis. He had a second operation by Roux-en-Y gastrojejunostomy with feeding jejunostomy, abdominal toilet, and temporary abdominal closure. After that, the patient was transferred to Siriraj Hospital for proper management.

At Siriraj Hospital, the patient presented with sepsis due to an intraabdominal collection, and his abdomen could not be closed due to a prolonged open abdomen and matted bowel. He had a split-thickness skin graft covering the matted bowel and was stabilized in the ICU for several days (Figure 1A).

After he recovered from sepsis, the anastomotic leakage closed spontaneously, and he was discharged with a large complex ventral hernia.

After he was discharged, the patient returned to daily life. However, he complained that he had a large ventral hernia. It could disturb his appearance because he is a singer (Figure 1B). The patient had to wait one year due to a lot of adhesions in his abdomen. Then he was scheduled for closure of the abdomen by posterior component separation with transversus abdominis release technique. The operation went smoothly, with no clinical signs of intra-abdominal hypertension (IAH) post-operation, and he was discharged 6 days after surgery without complications. The patient had follow-ups in the outpatient department at 1 month and 6 months post-operation. No complications were seen. His abdominal wall appeared normal in terms of shape and function. He felt happy because his abdominal wall looked normal, and he could sing confidently (Figure 1C).



Figure 1 A-B-C

1A- The patient had STSG for abdominal closure.

1B- Demonstrating a large ventral hernia 1 year after STSG.

1C- Appearance of the patient's abdomen 1 month after PCS/TAR.

BACKGROUND OF THE COMPONENT SEPARATION

Large complex ventral hernia is among the most challenging conditions, especially in patients who have complicated abdominal trauma. The common cause of complex ventral hernia is the result of temporary abdominal closure¹. The criteria for diagnosis include: defect >100 mm, loss of domain >20%, hernia at bony prominence, abdominal wound dehiscence, or multiple hernial defects².

The technique for abdominal wall reconstruction was first described by Ramirez et al in 1990³. This technique is now called 'anterior component separation'. This technique requires extensive skin and subcutaneous tissue flaps, a lack of space for prosthetic reinforcement, and recurrent rates of up to 30%, with 26%-42% wound infection rates⁴. The posterior component separation is based on the technique of Rives-Stoppa-Wantz retro-rectus repair⁵⁻⁷. This technique is limited because it cannot dissect over the lateral border of the posterior rectus sheath (PRS). Therefore, it is difficult to perform tension-free repair of the large defects that allow mesh overlap. The posterior component separation with transversus abdominis release technique (PCS/TAR) is a modification of the Rives-Stoppa-Wantz repair. It makes a space between the PRS and the rectus abdominis muscle to place a mesh. Releasing the transversus abdominis muscle provides an increase in space while preserving the neuromuscular supply. Novitski et al. published this PCS/TAR technique in 2012, noting a low recurrent rate, decreased wound morbidity, and rare mesh-related complications^{4,8}.

This PCS/TAR technique has become popular in the large complex ventral hernia reconstruction. It requires abdominal wall anatomy knowledge, appropriate surgical training, and strict prehabilitation programs⁸.

INDICATIONS

The PCS/TAR is primarily indicated for treating large and/or complex ventral hernias. Large ventral hernia is defined as a fascial defect with a width > 100 mm, or involving an important part of the abdominal wall, mostly over 25%⁹. This technique is appropriate for placing a large prosthesis, facilitating midline reconstruction. It is also suitable for lateral hernias, for which traditional approaches cannot perform a durable repair¹⁰. This technique is effective in significant comorbidities, for example, diabetes and COPD patients¹¹.

PREOPERATIVE CARE

Preoperative assessment is recommended for complex abdominal wall reconstruction. Preoperative abdominal computed tomography provides insights into the hernia defect dimensions, content, hernia sac volume to the abdominal cavity volume ratio, muscle thickness, and retroperitoneal abnormalities. Measurement of the length and width of the fascial defect helps ensure complete coverage and adequate mesh overlap.

Pulmonary function tests should be performed in patients with a history of heavy smoking or pulmonary disease. These patients should be assessed for baseline lung function and optimized perioperative care¹¹.

Patients with colon content in the hernia should usually have mechanical bowel preparation before surgery. Polyethylene glycol or PEG reduces postoperative complications in patients with colon in the hernial sac, but it is not universally required¹².

This patient has good pulmonary function due to his occupation as a singer. He does not have malnutrition or obesity. His CT shows an abdominal wall defect measuring 129 x 196 mm, and small bowel content in the hernia, so in this case, it is not necessary to receive bowel preparation (*Figure 2*).



Figure 2
Axial and sagittal CT images demonstrate the large ventral hernia and its contents.

SURGICAL PROCEDURE

The patient is placed in a supine position after general anesthesia is performed. These are the steps of the procedure:

1. Skin graft removal and scar excision

This patient previously had a split-thickness skin graft (STSG) for abdominal closure. The removal of STSG and scar excision started the procedure. Small bowel injury should be avoided when the hernial sac is close to the STSG. Dissection was done with the use of sharp scissors and surgical peanut sponges to identify the rectus sheath (*Figure 3*).

2. Rives-Stoppa plane creation

The posterior rectus sheath (PRS) was incised 5-7 mm from the midline to identify the Rives-Stoppa plane. The incision was extended along the entire length in cranial and caudal directions (*Figure 4*). Blunt and sharp dissection was applied to create a plane to the linea semilunaris on the lateral side. Neurovascular bundles represent the mark of the lateral extent of the dissection. Continuing dissection below the arcuate line at the caudal side, preserving the deep inferior epigastric vessels, exposing the Cooper ligaments and pubic symphysis. The dissection was repeated cephalad and may extend to the subxiphoid and costal margin.

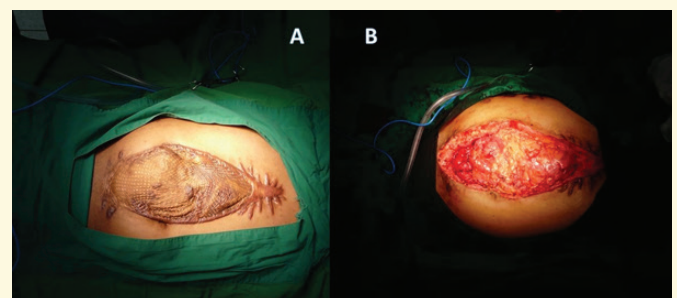


Figure 3 A-B
3A- Before STSG and scar removal.
3B- After STSG and scar were excised.



Figure 4
The white line demonstrates the incision for the Rives-Stoppa plane creation

3. Establishing the transversus abdominis (TA) release

The 5 mm incision was performed on the posterior lamella of the internal oblique aponeurosis, medial to the neurovascular bundles, to identify the TA muscle. The incision usually starts at the middle third, where the TA fibers are muscular, because the lower third is more aponeurotic. The TA fibers were divided by the 'bottom-up' approach with electric cautery to establish the plane (Figure 5). This approach continues to the cranial as well as caudal aspects of the plane. The dissection was repeated on the opposite side.

4. The posterior rectus sheath (PRS) closure

The PRS was reapproximated in the midline with less than 10 mm suture bites using 1-0 Polyglactin suture (Figure 6A). The peak/plateau respiratory pressure monitoring should be performed when the PRS is closed.

5. Mesh placement

A large polypropylene mesh was placed into the retro-rectus space between the rectus abdominis muscle and the reapproximated PRS. Trans-fascial fixation by 1-0 Polyglactin interrupted suture under physiological tension can help prevent mesh migration. The 10 Fr closed suction drain was placed to relieve seroma formation (Figure 6B).

6. The anterior rectus sheath (ARS) closure

The ARS was reapproximated with 1-0 Polyglactin continuous sutures. Peak inspiratory pressure and urine output should be monitored during closure of the sheath to identify signs of compartment syndrome.

7. Subcutaneous tissue and skin closure

The subcutaneous tissue was stitched using 2-0 polyglactin interrupted sutures. Lastly, the skin was closed with skin staples (Figure 7).

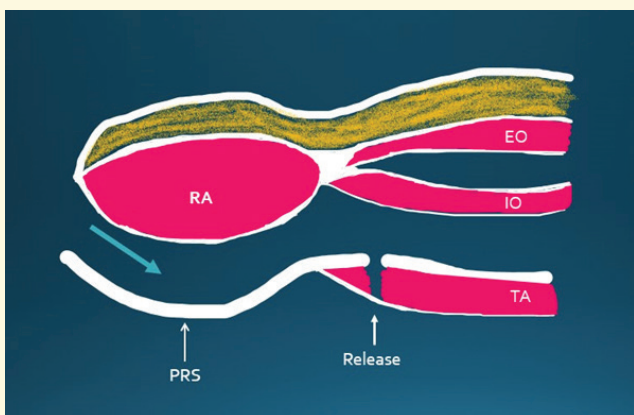


Figure 5

Demonstrating the Rives-Stoppa plane and TA release.

RA: Rectus abdominis muscle, EO: External oblique muscle, IO: Internal oblique muscle, TA: Transversus abdominis muscle, PRS: Posterior rectus sheath.

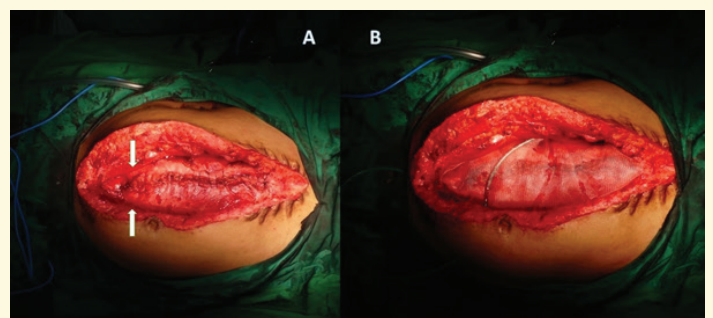


Figure 6 A-B

6A- The PRS was closed by a 1-0 Polyglactin continuous suture; the release TA fiber was seen at the border of the PRS (white arrow). 6B- A large polypropylene mesh was placed into the retro-rectus space, and a closed suction drain was placed to relieve seroma formation.



Figure 7- Skin was closed with skin staples.

POSTOPERATIVE CARE

This patient was encouraged to ambulate and feed when his intestinal motility recovered. Wounds were observed daily for the presence of hematoma, seroma, and infection. The color and volume of the drain were also monitored, and it can be removed when the daily output decreases to 50ml/day. The patient was discharged after tolerating an adequate oral diet, with no complications. He was advised to avoid heavy lifting for at least one month.

The patient had a follow-up in the outpatient department 2 weeks after surgery for staple removal, 1 month, and 6 months for clinical examination. No complications were seen. His abdominal wall appeared normal in terms of shape and function. Finally, he could perform his songs well.

DISCUSSION

The advantages of PRS/TAR include: first, it facilitates substantial medialization of the rectus abdominis muscle, achieving 80-120 mm on each side, in contrast to 50-70 mm with anterior component separation¹³.

Second, large skin and subcutaneous tissue flaps are not required, which might result in wound complications. Third, the underlying viscera do not directly contact the mesh after closing the PRS. Last, this technique is particularly effective for patients who have morbidity, such as diabetes and obesity¹¹.

However, this technique requires understanding abdominal wall anatomy and appropriate training. Significant concerns are avoiding neurovascular bundle injuries when creating the TA plane, injury to the semilunar line, and accidentally making a hole in the posterior layer. These risks can be reduced by considering the surgical technique.

In 2014, Criss et al evaluated the abdominal wall function of 13 patients who underwent PCS/TAR and agreed to dynamometric analysis before and 6 months after operation¹⁴. The study showed that 'the PCS/TAR improved peak torque, power during isokinetic analysis, and quality of life'. The authors concluded that restoring the linea alba by returning the rectus muscle to midline improved abdominal wall function and quality of life.

Many studies showed good results of the PCS/TAR in the risk of recurrence and incidence of surgical site infection, but no studies included trauma patients. For example, Novitsky et al showed the result of 428 consecutive PCS/TAR procedures in 2016¹⁵. Only 39 patients (9.1%) developed surgical site infections. Moreover, the recurrence rate was only 3.7%.

Wegdam et al published a systematic review of 5 articles, including 646 PCS/TAR patients in 2019¹⁶.

They focused on postoperative complications and recurrence rates. Pooled calculations demonstrated that the mean surgical site infection occurrence rate of PCS/TAR was 15%, while 20-35% by ACS. The mean 2-year recurrence rate was 4%, but 13% after ACS. The authors concluded that PCS/TAR is a good alternative regarding surgical site occurrence and recurrence, especially in large ventral hernia.

In 2019, Como et al reported a trauma case in which a patient received PCS/TAR¹⁷. A middle-aged man had a gunshot wound to the abdomen with multiple intraabdominal injuries. His abdomen was closed by STSG due to leakage of hollow viscus anastomoses and low-output enterocutaneous fistula. He had PCS/TAR at 9 months later. His abdominal wall defect was 120 mm in width. He did not have in-hospital complications, and he was discharged on postoperative day 8. Two months after the operation, he was feeling well, with no evidence of infection, and able to do sit-ups without evidence of recurrent hernia.

The PCS/TAR has been performed by open technique, but some studies reported using minimally invasive approaches with TAR¹⁸⁻¹⁹. The robotic TAR has been proven feasible and is a good option for correcting complex abdominal wall defects. Although it has a prolonged operative time, it reduces pain, facilitates recovery, and decreases the length of hospital stay. This robotic TAR might soon be an alternative surgical technique for complex abdominal wall defects.

LIMITATION

This case report needs a long-term follow-up on the risk of surgical site infection, recurrent hernia, and abdominal wall function.

CONCLUSION

The PCS/TAR is a technique for correcting complex abdominal wall defects that lowers recurrence and infection rates. Success demands understanding the anatomy of the abdominal wall, appropriate training, and adopting a prehabilitation program. The PCS/TAR continues developing, especially by adapting minimally invasive or robotic surgery. There is less data to use this technique in trauma patients. This case report is an example of using PCS/TAR in a trauma patient with no complications, short hospital stays, and a good functional outcome.

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สมาคมแพทย์อุบัติเหตุแห่งประเทศไทย

01

A scarless approach to mitigate external wound complications

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- Chidpong Siritongthaworn, M.D.

02

Road-traffic injuries (RTIs) resulting early death at the emergency room in Khon Kaen hospital in COVID-19 pandemic: a descriptive study

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- Thanachart Hirunsomsap, M.D.
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03

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