出國報告（出國類別：開會）

以微創概念重新制定新的手術入路方式來治療肘關節複雜骨折合併脫臼之創傷

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摘要

肘關節複雜創傷在以往是使用大範圍的手術傷口來實施開放式復位與內固定手術，對於軟組織與神經方面會產生較多的併發症；藉由創新的微創手術方式與實際治療成果，與他國專家討論，除了增進臨床技術，亦能增加台北榮總的知名度。

筆者參與的會議是日本骨科醫學年會，入選一篇海報發表；日本骨科年會的海報發表與國內骨科年會最大不同的是，日方於每個發表時段仍會安排座長，海報作者也有指定的口頭演說時段，反觀國內的poster僅有壁報或是電子展示。

藉由筆者所提出的治療流程圖，臨床上遇到此類患者時，應更能有效率地制定手術前計畫。

目次

一、目的

臨床上有許多肘關節的骨折脫臼嚴重度，會超過所謂的「terrible triad」，例如「trans-olecranon fracture-dislocation」、「posterior Monteggia fracture-dislocation」，與之相比，「terrible triad」可以說只是「HAPPY triad」；其中最困難復位的結構在於 coronoid process 與 ligaments，尤其是在冠狀突的基底部塌陷與韌帶附著處崩解的情形下，甚至會出現「10 位專家有可能會提出 11 種不同手術入路」的狀況。

在以往，最多專家使用的是大範圍的「後側入路傷口」、合併「往內側或外側剝離軟組織」來實施開放式復位與內固定手術，但是此方式對於軟組織與神經方面會產生較多的併發症。

此研究的目的在於整理筆者過往手術經驗，藉由「多重微小入路」也能達成過往單一大傷口的復位效果，同時分析在不同型態的骨折脫臼，其粉碎的構造亦各有不同的復位順序；最後彙整為一套治療流程圖，並將關鍵之處與現場的日本專家分享與討論。

二、過程

以下內容包括演說過程照片與案例的分析。

Fig. 1: Posteromeital rotatory instability

2-incisions: Anteromedial approach + Kocher approach

***Surgical Steps:**

1st : Lasso technique + k-wires (A to P, then retro-grade bending) for coronoid process

2nd : LCL complex repair

3rd : Recheck MCL

Fig. 2: Terrible triad

2-incisions: Anteromedial approach + Kocher approach

***Surgical Steps:**

1st : ORIF (1.5mm HCS + plating with 2.0mm screws) for coronoid process (3x5mm in size)

**2.0mm screw was too large, the LCP had no screw purchasing on coronoid process

2nd : Plating Radius head

3rd : LCL complex repair under pronation plus valgus stress

4th : Recheck MCL

Fig. 3: Trans-olecranon fracture-dislocation & Radial head fracture

3-incisions: Anteromedial approach + posterior MIPPO + Kocher approach

***Surgical Steps:**

1st : Inter-fragmentary screws for coronoid process

2nd : MIPPO for olecranon process

3rd : HCS for radial head

Fig. 4: Posterior Monteggia fracture-dislocation:

Radial head/neck fracture & LCL-complex tear (the insertions were

***Surgical Steps:**

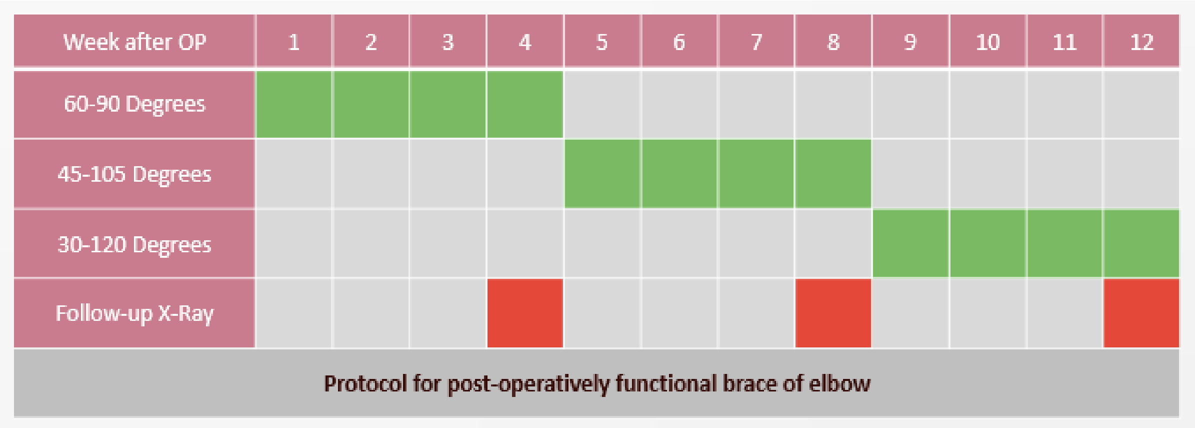
1st : 1/3-tubular plate for olecranon process & ulna shaft (the first step was not to fix the coronoid process)

2nd : One 4mm cannulated screw for coronoid process + interfragmentary screw for metaphyseal fragment

3rd : K-wire reconstruction of radial head + mini-plates for radial head/neck

4th : Trans-osseous repair of LUCL, primary suture of LRCL & annular ligament

5th : Recheck MCL



Week after OP	1	2	3	4	5	6	7	8	9	10	11	12
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45-105 Degrees					🟩	🟩	🟩	🟩				
30-120 Degrees									🟩	🟩	🟩	🟩
Follow-up X-Ray				🟥				🟥				🟥

Protocol for post-operatively functional brace of elbow

(Table 1)

Methods.

This is a retrospective review at Taipei Veterans General Hospital. Patients who had elbow dislocation with coronoid process fractures underwent surgeries through MIS techniques.

The post-operatively functional brace was according to the protocol in the **Table 1**.

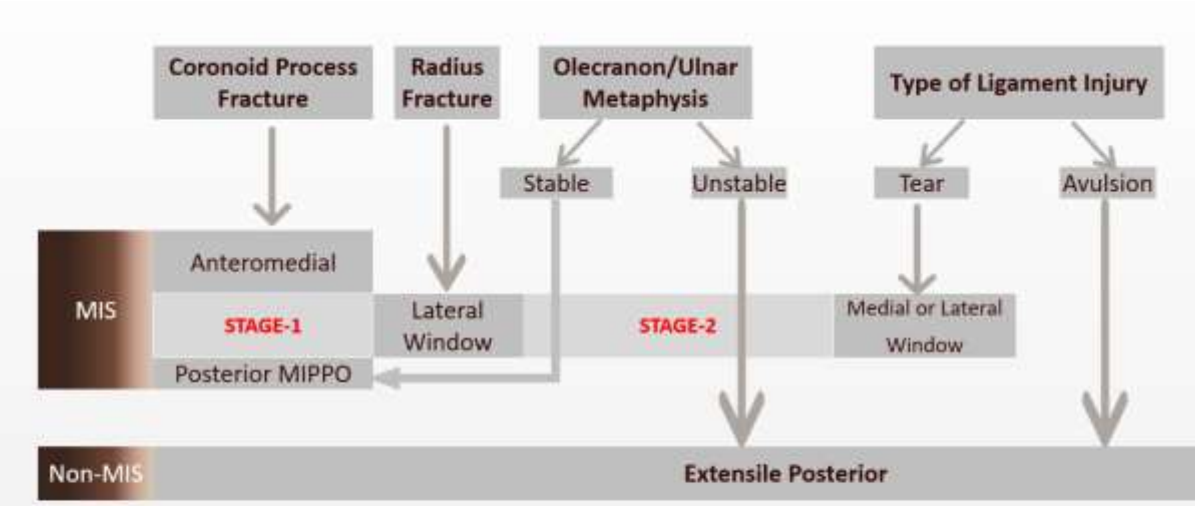
Results.

Four cases were identified. The pre-operative and post-operative images, and the surgical steps are as presented as the **figure 1 to 4**. One had anteromedial coronoid process fracture in situation of posteromedial instability(Fig. 1), and another one had transverse coronoid process fracture in posterolateral instability(Fig. 2). Other two patients had trans-olecranon(Fig. 3) and posterior Monteggia fracture-dislocation(Fig. 4) respectively. All patients had functional arc of elbow and full forearm rotation not later than 3 months after operation. There were no malunion nor heterotrophic ossification.

三、心得

日本骨科年會的海報發表與國內骨科年會最大不同的是，日方於每個發表時段仍會安排座長，海報作者也有指定的口頭演說時段，反觀國內的 poster 僅有壁報或是電子展示。

筆者所提出的治療流程圖，應能幫助主治醫師更有效率地制定手術前計畫：



Flow Diagram of Approach Selection for Elbow Fracture-Dislocation

There were 2 STAGES in the **Flow Diagram** for surgical techniques of MIS:

In the **STAGE-1**, the fractured coronoid process was exposed with curved anteromedial approach. When reducing the coronoid fragment, one 1.25mm K-wire was perpendicularly applied. Then the anatomical position of ulnohumeral joint was confirmed under the “splinting-force” of the K-wire. A 1.5mm headless compression screw was then applied. Another small-sized LCP was used as a buttress plate on coronoid slope. Finally, the temporary K-wire was exchanged to one another 1.5mm headless compression screw.

When the patient sustained trans-olecranon or posterior Monteggia fracture dislocation, the comminuted proximal ulna was reduced through 2 surgical windows, the ***anteromedial and posterior incisions synergistically***.

Before shifting to the **STAGE-2**, the radial head fracture was exposed using the Kocher approach with screw and/or plate fixation.

In the **STAGE-2**, the elbow stability was checked under C-arm fluoroscopy for determining whether or not the ligament should be repaired through lateral or medial surgical window.

重點在於：

對於存在有 coronoid fracture 的 elbow fracture dislocation 而言，獨立的 anteromedial approach 是關鍵的步驟，可以有效減少傳統後側入路所需的大範圍軟組織 dissection，在大部分的情況下，reduction of coronoid process 在「STAGE-1」是 first priority，但是當 base of coronoid process 同時發生 fracture with displacement 的時候，就必須透過 posterior MIPPO 方式，先固定 proximal ulnar bone，才能進一步固定 coronoid fracture site，例如 posterior Monteggia fracture-dislocation，這時候 posterior MIPPO 在「STAGE-1」就會是 first priority，然後在接著做 AM approach 的同時，後側傷口暫時不關閉，可以幫助冠狀突的復位；「STAGE-1」的尾聲是透過 lateral windows 復位固定 radius bone；下一階段則是評估 LCL 或 MCL 是否需要重建，經由外側或內側的小傷口，此時為「STAGE-2」。

若是近端尺骨過度粉碎、或是 ligament insertions 已經不存在，posterior MIPPO 有可能需要改變成 extensile approach，小傷口亦變成大傷口，所謂的「minimal invasive surgery」則無法成立；但是即便如此，獨立的 AM approach 對於 coronoid process 也能提供較佳的固定。

Conclusion. Although conventional extensive approaches can be used to do these fractures well, there exist soft tissue's problems and risk of nerve traction. **MIS can be achieved by multiple small incisions**, even in the case of posterior Monteggia fracture-dislocation . The key point in the protocol is that reducing proximal ulna is not dependent on the massive soft-tissue dissection from posterior to lateral (or medial) elbow. However, if there is **unstable olecranon/ulnar metaphysis** or **ligament's avulsion fracture**, the posterior incision has to be extended to medial or lateral side in order to fix the small fragments. In this kind of situation with extended posterior approach, the so-called MIS fails to be established.

未來展望：

以 perspective study 收案，推廣此治療流程。