



Neurosurgery in Iraqi Kurdistan: An Example of International Neurosurgery Capacity Building

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The medical infrastructure of Iraqi Kurdistan, a semi-autonomous region in the northern part of Iraq, lags disproportionately behind relative to the otherwise booming industrial advances of the region. Although neurosurgical training is available, the local population lacks trust in its own neurosurgeons. Medical facilities suffer from a lack of basic resources, such as high-speed drills, intracranial pressure monitoring, and stereotaxy to care for neurosurgical patients. Since 2012, American volunteer neurosurgeons have delivered lectures and mentored local neurosurgeons in performing neurosurgical procedures. Over the last 4 years, the visiting neurosurgical team has seen hundreds of patients in consultation and performed more than 50 complex cranial and spinal operations jointly with local neurosurgeons. This article discusses our experience as volunteer neurosurgeons in building neurosurgical capacity in Iraqi Kurdistan.

(western Kurdistan).^{1,3} The Kurdistan Region of Iraq is governed by the Kurdistan Regional Government (KRG), a semiautonomous parliamentary democracy under the purview of the larger Iraqi government.^{1,3} Iraqi Kurdistan is divided into 4 governorates, Duhok, Silemani, Erbil, and Halabja, encompassing about 40,000 km² with a population of more than 5 million people.^{1,3}

As part of Iraqi Kurdistan, Duhok is financially well endowed, largely because of the natural resource of oil. Its infrastructure gleams with modern roads, buildings, and bridges. Basic amenities of life including electricity, water, shelter, and clothing are ubiquitous. Internet and cellular services are widely available and affordable. Yet, development of medical infrastructure lags disproportionately behind the otherwise booming industrial advances of the region. The hospitals appear aged and dilapidated, medical equipment is sparse, training programs are meager, and doctors lack the broad training that is often taken for granted in the United States. Further, the local culture of medical practice is in stark contrast to the round-the-clock standard of patient care in the United States. The challenge of bolstering the medical infrastructure lies not only in advancing technology but also in inculcating an ethos compatible with the proficient practice of the art of medicine and surgery.

Dr. Gazi Zibari, an American-trained transplant and hepatopancreatobiliary surgeon who hails from Duhok, has led medical mission trips for more than 2 decades to the Duhok region of Iraq. In May 2012, Zibari introduced neurosurgeons to a multidisciplinary team of American-trained trauma surgeons, otolaryngologists, ophthalmologists, anesthesiologists, and other medical professionals to enhance capabilities in Duhok (Figure 1). Over the years, the neurosurgery team has evaluated and operated on patients at Duhok Emergency Hospital, the local trauma center where most of the region's emergent and elective neurosurgical procedures are performed. Volunteer neurosurgeons have delivered lectures on key neurosurgical topics and mentored local neurosurgeons in performing progressively more advanced

INTRODUCTION

Kurdistan is a roughly defined geopolitical region where the majority of the population are Kurdish and where the Kurdish language, culture, and identity are historically based. Kurdistan is located amid the mountains of Ararat, a biblically notable location where Noah's Ark rested after the great flood in the heartland of ancient Mesopotamia.^{1,2} The area of Kurdistan is not a sovereign independent nation but is made up of a large area overlapping 4 countries, including southeastern Turkey (northern Kurdistan), northeastern Iraq (southern Kurdistan), northwestern Iran (eastern Kurdistan), and northern Syria

Key words

- Angioplasty
- Aortic arch reconstruction
- Arterial occlusive disease
- Intracranial stenting
- Mechanical thrombolysis
- Stroke

Abbreviations and Acronyms

- CT:** Computed tomography
ICU: Intensive care unit
KRG: Kurdistan Regional Government

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Figure 1. American delegation of multidisciplinary medical professionals to Duhok in 2014. Dr. Gazi Zibari, leader of our multidisciplinary delegation to Kurdistan, is seated fourth from the right. (Photo courtesy of Dr. Rimal Dossani.)

neurosurgical procedures. Since the start of the volunteer neurosurgical efforts, local neurosurgeons have shown rapid growth in their technical abilities, reliably performing procedures of increasing complexity. The local patients are beginning to trust their own neurosurgeons to handle their surgical care.

This article shares our experience partnering with our Kurdish neurosurgical colleagues to build capacity in the Duhok governorate of Iraqi Kurdistan with the neurosurgical community.

GEOGRAPHY AND BRIEF HISTORY OF IRAQI KURDISTAN

Iraqi Kurdistan is a picturesque region studded with scenic rivers, lakes, and mountains.^{1,2} The highest point is Halgurd at a height of 3660 m located near the border with Iran.³ Several rivers, including the Tigris flowing in from Turkey, render the region verdant and fertile.^{1,3} The weather is tropical with ample rain and torrid summers counterbalanced by harsh winters in the mountainous regions.

Although the Kurds are spread over 4 countries, they have been successful in Iraq alone in establishing a regional government. In 2005, the Constitution of Iraq recognized Iraqi Kurdistan as a semiautonomous region run by the KRG, which directly reports to the federal government of Iraq.⁴⁻⁶ The KRG is a parliamentary democracy with a regional assembly overseeing 4 governorates, with Erbil as the capital city.^{1,3} The official languages are Arabic and Kurdish, and the current president is Massoud Barzani, who was elected in 2005 and has since been re-elected.³

Iraqi Kurdistan has experienced a protracted and painful history in achieving the dream of a degree of self-governance.^{4,7} In the

early twentieth century, the Kurds were under British colonial control and later fell under the rule of Saddam Hussein. Toward the end of the Iran-Iraq war in 1988, Hussein launched the Anfal campaign, an ethnic genocidal operation against the Kurdish people.⁸ Headed by Saddam's cousin Ali Hassan Al-Majid, known amongst the Kurds as Chemical Ali, the Anfal campaign mercilessly deployed chemical agents, as well as aerial and ground attacks, as a manifestation of ethnic hatred killing more than 150,000 Kurds and destroying over 4500 Kurdish villages. More than a million Kurds were displaced from their homes.⁸

In the years after the Anfal campaign, the Kurds gathered strength and harnessed their cultural pride to establish a local military force known as the *peshmerga* ("those who face death").⁴ The *peshmerga*'s uncompromising grit and mettle in war empowered the Kurds to expel Hussein's forces and to establish a no-fly zone at the end of the First Gulf War in 1991.^{2,5} The Kurds subsequently scored enough political victories to gain the KRG in 2005, 2 years after the United States' invasion of Iraq.

Recently, the *peshmerga* have once again become embroiled in warfare, this time against the insurgents belonging to the Islamic State in Iraq and Syria (ISIS).⁹ In June 2014, ISIS militants invaded and captured Mosul and other nearby regions about 400 km north of Baghdad. The *peshmerga* have safeguarded the Iraqi Kurdish borders and have been successful in warding off the ISIS threat from encroachment into Iraqi Kurdish territory.⁹ Despite the looming fear of war, the sense of security inspired by the *peshmerga* permitted Dr. Zibari's medical team to successfully complete yet another medical mission trip to Iraqi Kurdistan in April 2015.

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