ELECTIVE (SSC5c) REPORT (1200 words)

A report that addresses the above four objectives should be written below. Your Elective supervisor will assess this.

What is the prevalence of anatomical variation within the hyoid bone within the population in the UK and how does this differ from the rest of the world?

My elective was a short placement which allowed me to complete some work which had been started in my BSc year. I have always been interested in forensic medicine and this study essentially looked at one anatomical structure in the body and how its variation in anatomy could pose a threat to pathologists with regards to interpretation in the world of forensic medicine.

The hyoid bone is a horseshoe-shaped bone located between the mandible and the larynx and consists of 3 recognised parts the body, which contributes to the bulk of the bone, and the greater and lesser horns which act as attachment sites for various muscles associated with the tongue, pharynx and neck. This bone offers a huge contribution to forensic medicine as it is this bone and its associated cartilages that commonly present with fractures, if specific neck trauma has occurred.

Out of all 72 cadavers that were examined here in the UK, 11 cases showed the normal textbook anatomy for the hyoid bone, that means 61 cases had an anatomical variant. This means that 85% had a hyoid bone that was not considered normal as it is in textbooks. With regards to how this compares to the rest of the world, it has been hard to find such data due to this being such a specific topic. Many studies have been conducted in other countries such as India which seek to determine other factors but not whether the hyoid bone anatomy is variable or not.

How could this data help to expand the field of forensic science in the UK? How does this data differ from other countries for example, the US?

The laryngeal region in the world of a forensic pathologist is very important and can provide quite a challenge to some. The limited data about the structures within the region mean that more knowledge is required as to the incidence rates of the anatomical variants as well as some of the rare anomalies that were found throughout the study. This is something pathologists need to keep in mind when carrying out post mortems as such small structures can have a huge impact on the conclusions made from the post mortems.

The results obtained from this study helped to show that the majority of the cadavers (85%) showed fusion of the greater horns with the body of the hyoid bone. This fusion is what is classed as anatomically abnormal. The incidence of complete fusion as stated by Evans and Knight (1981) was 35% in the UK. Although the value obtained in this data set is significantly higher, this can be explained by looking at the age range (average of 63 years), as fusion is commonly seen in the older generation. It could also be due to the fact that London is more culturally diverse than it was in Evans and Knight's time and so the high rate of hyoid bone fusion could be due to race.

Again as mentioned before it has been hard to find the rate of hyoid bone fusion in other countries, however I hope that this study can be carried out in other countries so that we can determine whether race plays a significant role in hyoid bone anatomy.

To complete a systematic review which identifies abnormalities in hyoid bone anatomy and determine how this can be translated into every day forensic practice for UK pathologists.

The systematic review that I carried out did not only focus on hyoid bone anatomy but also many structures within the laryngeal region. This is reflected in the abstract which is shown below as it adequately summarises the entire study :

Objective: The laryngeal region is of high significance to pathologists when determining whether mechanical asphyxiation has occurred. Anatomical abnormalities in this region can lead to pathologists wrongly concluding the cause of death in some individuals. This paper aims to identify the proportion of anatomical variants present within the population.

Method: In this observational study, 72 cadavers (47 males and 25 females) were examined during post mortems for certain features within the laryngeal region, namely these features were the fusion of the greater horns with the body of the hyoid bone and the monolateral or bilateral presence or absence of the triticeal cartilages and superior cornua (horns) of the thyroid cartilage. In addition to this, age and sex were examined as a variable for these anatomical features. Any rare or unusual findings were also noted.

Results: 85% (61/72) of the sample had fusion of the hyoid bone and 51% (37/72) had bilateral absence of the triticeal cartilages. 22% (16/72) had monolateral triticeal cartilages, whilst 27% (19/72) showed bilateral triticeal cartilages. 96% (69/72) had bilateral presence of the superior cornua of the thyroid cartilage and only 3 cadavers (4%) displayed abnormal thyroid cartilage anatomy. There was no evidence of association of age or sex with the three anatomical structures. Significant unusual features noted in this study were, absences of one of the superior horns of the thyroid cartilage, the formation of a joint within the thyroid horn as well as artefactual damage of the thyroid cartilage.

Conclusion: A significant proportion of individuals showed fusion of the hyoid bone, absence of the triticeal cartilages and bilateral presence of the superior cornua of the thyroid cartilage. This knowledge can be used to aid pathologists in identifying some of the pitfalls which can occur when examining this region and shed some light on why examining these features alone may not help to identify if mechanical asphyxiation was a cause of death.

To explore a career in forensic science and develop my skills as a student and scholar

Since I was very young I had always enjoyed the topic of forensic science and medicine. I was lucky enough to be given the opportunity in my BSc which allowed me to further develop my interest and was able to speak to forensic physicians about their work life. Forensic medicine as a career could range from psychiatry through to prison medicine or even some subspecialties such as paediatrics or neurology. Although there is currently no recognised pathway for doctors to become forensic physicians it is something that has been achieved by others abroad and I am sure that it is only a matter of time before a pathway is introduced in the UK.

I was able to continue this work which I initially started a year ago and am looking to publish the study in the near future. I feel that this was an essential skill that I wanted to learn as a student before I started in the world of work, as learning to be a scholar is a different skill entirely. I am

pleased to say that I now feel more confident in my skills as a scholar and hope to carry that on through my foundation years.