Development of a Database for Storage and Analysis of Factors Affecting Treatment of Hepatocellular Carcinoma

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Abstract

Hepatocellular carcinoma (HCC) is the fifth most common solid tumor worldwide. There are 626,000 new cases per year of primary liver cancer worldwide, most of which are HCC. Over 1,000,000 people die of HCC per year, making HCC the third most frequent cause of cancer deaths worldwide(1). The standard treatment for HCC is surgical resection, however on presentation many patients have progressed to the point where such treatment is not an option, and are placed on liver transplant lists. Palliative treatment modalities are often used in the interim, including trans-arterial chemoembolization (TACE), radiofrequency ablation (RFA), or systemic chemotherapy. In this study over 200 patients who received either Therasphere or Sirsphere (TACE methods), or RFA treatment for unresectable HCC were catalogued in a relational database allowing for analysis of treatment outcomes and treatment comparisons. A Microsoft Access database was created to store data such as patient demographics, disease details, adverse events, patient lab values, treatment details, and pre- and post-lesion measurements. This database is currently in use by the department of Interventional Radiology at Banner Good Samaritan Medical Center.

Database population

The initial set of data for this project was collected by hand by Dr. David Wood and compiled by members of the Interventional Radiology department at Banner Good Samaritan hospital in a Microsoft Excel file. This method of data entry was cumbersome and did not allow the production of reports for a particular patient or particular set of variables. The original data was extracted manually from patient medical records, from records in the BGS liver center, and from observations made during IR procedures.

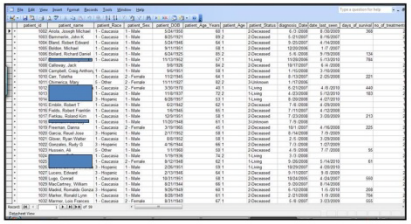

Figure 1: Construction of data tables for HCC database

Data stored in HCC database

Patient demographics including race, sex, age, diagnosis date, current status (living or deceased), days of survival, number of interventional radiology treatments, treatment type(s), disease etiology, lesion distribution and morphology, characteristics of the disease such as presence of ascites, portal vein thrombosis, etc, as well as standard prognostic scores including Okuda, Child-Pugh and ECOG are stored in the HCC database.
Lab values, including α-fetoprotein levels, AST, ALT, alkaline phosphatase, albumin, total bilirubin, PT and INR are stored for each patient. Pre- and post-treatment lesion measures and degree of necrosis are listed for each tumor in each patient. Treatment details including radiation dose date, dose, and region of distribution are also recorded.

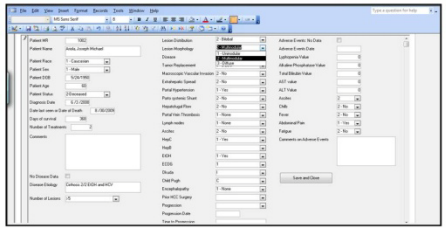

Figure 2: Construction of forms for data viewing and data entry

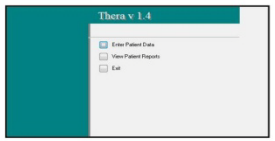

Figure 3: Main switchboard

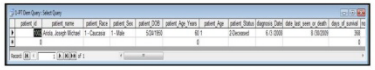

Figure 5: Result of query in table form

Database construction

Tables containing related data were constructed in MS Access. For example, a table containing patient demographics, variables related to disease description, and recorded adverse events stored multiple points of data per patient (Figure 1). Corresponding forms to the data tables were constructed, allowing ease of viewing of the data stored in the tables as well as data entry (Figure 2). A main switchboard form was created to act as an initial point for data entry/editing and preparing patient reports (Figure 3). Queries were then created which extracted desired data from data tables to be presented in reports. For example, if the user desired to view treatment details and lesion measurement data for a patient, the queries would extract relevant data and present them in report form (Figure 5). Results of queries may also be presented in table form (Figure 4).

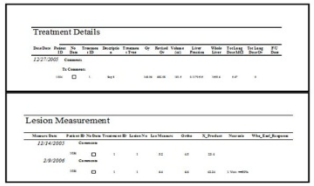

Figure 4: result of query in report form

Discussion

The HCC database allows for ease of use in entering and accessing data for patients treated for HCC. From a user standpoint, two simple steps are required to reach the patient data entry forms. After opening the database, the user clicks on the "Enter patient data" box from the main switchboard. The user then tabs to the first available blank record, enters data, and clicks the "save and close" button when data entry is completed. The HCC database provides a secure method of data entry and report generation for patients undergoing treatment for HCC at BGS Medical Center. The database is in effect password protected as it is located on a shared drive accessible only by BGS employees with password access to that drive. Data is entered for each patient by the Interventional Radiology staff as the patient is undergoing treatment. Creating data repositories such as this HCC database have significant implications for future research. Given the information in this database, analyses such as comparison of treatment response for different treatments, treatment response for patients with differences in initial pathology, and comparison of adverse events for different treatments can be performed. Additionally, the stored information may be shared with other institutions for pursuing multi-center research. As pathology specimens are stored for each patient by the pathology department, the possibility of comparing treatments on specific molecular and genetic profiles of each tumor might also be pursued.

References

1. Parkin DM et al.: Global Cancer Statistics, 2002. CA Cancer J Clin 55:74, 2005.
2. Burak KW et al.: An evidence-based multidisciplinary approach to the management of hepatocellular carcinoma (HCC): the Alberta HCC algorithm. Can J Gastroenterol 24(11):643-50 (2010)