

E-Multidisciplinary Oncology Conference for Liver Cancer as a Technology and Method to Optimize Personalization and Outcomes in the Peripheries

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Abstract. Aim: To search feasibility and reliability of Telemedicine Systems (TS) in the remote multidisciplinary oncology conference for decision making and treatment of liver lesions. Material and Methods: By an experimental TS, twenty six (n=26) specialists based on a series of five (N=5) simulated remote image examinations, assessed sensitivity-specificity of the remote examination of the Liver (L) for neoplastic diseases and damages (Virtual Examination=VE). Results: Analysis showed: injuries (sensitivity=96%), injuries of the capsula (sensitivity=91.7%), hematomas (sensitivity=91.7%), non-neoplastic diseases (specificity=100%), neoplastic diseases (sensitivity=100%). Conclusion: The VE of the (L) in combination with high-tech visualization and multimedia and the remote participation of liver surgical oncology, oncology, radiology, pathology and cytology experts composes a feasible and reliable e-Multidisciplinary Oncologic Conference for a Personalized and Optimum Decision Making and Treatment in Liver Cancer.

Keywords. Tele-Medicine, Tele-pathology, Tele-radiology, Liver Cancer, E-Multidisciplinary Oncologic Conference

1. Introduction

The optimal management of patients with liver cancer (LC) requires the expertise of specialists from different disciplines. This has led to the evolution of multidisciplinary teams (MDTs), allowing all key professionals to jointly discuss individual patients and to contribute independently to clinical decisions. However, LC MDTs in different regions in the periphery and countries are scarce [1,2]. The project searches feasibility-reliability of Telemedicine Systems (TS) integrated with Multimedia Systems (MS) for remote e-Multidisciplinary Oncology Conference in LC interrelated with Teleradiology (TRE) and Telepathology (TPE) evaluation of the patients and the liver (L) for optimum decision making and surgical planning [3,4,5].

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2. Material and Methods

Experimentation included.

The development of an OTE-TS similar Experimental TS (Exp.-TS) for the simulation of the integrated TS, MS and AI based TRE and TPE virtual examination of the patient and the liver viscera remotely (pn 1009078, 34931, 34932, 34933) (Table 1).

Table 1. Comparison of the Modules between OTE-TS and Exp.-TS

Modules	OTE-TS	EXP-TS
a. Medical record process	+	+
b. Examinations results.	+	+
c. Capture scanning and imaging.	+	+
d. DICOM and PACS vision.	+	+
e.Real-time tele-conference	+	+
f. Chat and whiteboard facilities.	+	+
g. Application sharing.	+	+
h. Tele-secretary facilities.	+	+
j. Tele-Mentoring facilities	+	+
i. Telecommunication net	ISDN based	Internet based
k. Multimedia System	+	+
l.AI computation system	-	+

Simulation of the TRE of (Ls) on 15 abdominal MR digital images taken by the ACS-NT GYROSCAN MRI POWERTRACK 6000, 1.5T, (by PHILIPS) and projected on the Exp.-TS in the intranet of the Department of Radiology of the Aretaieion University Hospital for examination of damages and lesions by a radiologist (2012) (Figure 1).

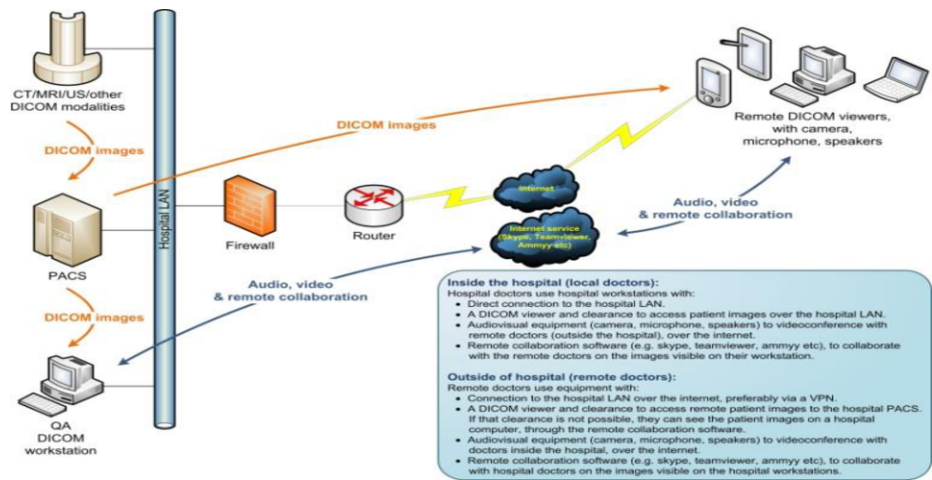


Figure 1. Collaboration between the hospital in the periphery and the Multidisciplinary Team for the remote examination of the patient’s medical record and its medical data focused on Liver Cancer for the realization of the e-Multidisciplinary Oncology Conference for remote decision making and surgical planning via internet (DICOM and PACS based remote digital visualization of the necessary radiological examinations).

Experimental simulation of the remote virtual evaluation of the (L) upon n=5 digital histological images by 26 specialists in the intranet of the department of Pathology of the Medical School of Athens (2013).

Sensitivity-specificity analysis of the results by using the SPSS statistical software (version 17.0).

3. Results

All examiners defined (L) and diagnosed damages and lesions (Tables 2, 3, 4).

Table 2. Simulated TRE of the patients' (L)

	N	TP	FP	FN	TN	SENSITIVITY	SPECIFICITY	ACCURACY
Damages and Lesions	15	4	0	0	11	100,0	100,0	100,0

N=Number of images given for examination, TP=True Positive, FP=False Positive, FN=False Negative, TN=True Negative, Sensitivity(%), Specificity(%), Diagnostic accuracy (Efficiency)(%.)

Table 3. Simulated TPE of the patients' (L)

	N	A	TP	FP	FN	TN	SENSITIVITY	SPECIFICITY	ACCURACY
Damages and Lesions	26	26	24	0	1	0	96,0	-	96,0

N=Number of Photos given for examination, A=Number of Answers after Examination, TP=True Positive, FP=False Positive, FN=False Negative, TN=True Negative, Sensitivity (%), Specificity(%), Diagnostic accuracy (Efficiency)(%.)

Table 4. Integrated TRE and TPE of the patients' (L)

	N	TP	FP	FN	TN	SENSITIVITY	SPECIFICITY	ACCURACY
Damages and Lesions	41	28	0	1	11	96,6	100,0	97,5

N=Number of images given for examination, TP=True Positive, FP=False Positive, FN=False Negative, TN=True Negative, Sensitivity(%), Specificity(%), Diagnostic accuracy (Efficiency)(%.)

4. Discussion

The abovementioned very promising results confirmed clinically in the periphery of Greece with a clinical case of a female patient which had suffered from a right renal cancer that had been treated in the past but now suffered from an exacerbation characterized with a right lobe liver mass (July 2021). The patient treated with a surgical intervention based on the decision of the remote e-Multidisciplinary Oncology Conference in Liver Cancer using the above described technology and method focusing on tele-radiology. With regard to safety issues RH Morgan [6] proposed the Virtual private networks (VPN) as adequate solutions for authentication, access control and confidentiality. The secure hypertext transfer protocol (https) can be used to encrypt for web distribution. A public key infrastructure (PKI) solves all the issues mentioned above. Clinical efficacy research protocols for further study of the remote e-Multidisciplinary Oncology Conference in Liver Cancer is of high priority [7,8].

5. Conclusion

The VE of the (L) in combination with high-tech visualization and multimedia technology and the remote participation of liver surgical oncology experts for the realization of the e-Multidisciplinary Oncologic Conference seems feasible and reliable to optimize liver cancer personalized decision making and then multidisciplinary management in high volume liver units for the patients in the periphery of Hellas.

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