Short papers

Ultrasound guided pericardial drainage and intrapericardial instillation of mitomycin C for malignant pericardial effusion

Li-Na Lee, Pan-Chyr Yang, Dun-Bing Chang, Chong-Jen Yu, Jeng-Chung Ko, Yuang-Shung Liaw, Ren-Guang Wu, Kwen-Tay Luh

Abstract

***Background* – Conservative treatment of malignant pericardial effusion by intrapericardial instillation of a sclerosing agent may be an alternative to surgery.**

***Methods* – Twenty patients with malignant pericardial effusion were treated by ultrasound guided pericardiocentesis and the intrapericardial instillation of mitomycin C.**

***Results* – Mitomycin C was effective in controlling the pericardial effusion in 70% of patients without causing side effects, except for pericardial constriction seven months later in one subject.**

***Conclusions* – Ultrasound guided intrapericardial instillation of mitomycin C is a suitable alternative in the management of malignant pericardial effusion.**

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Malignant pericardial effusions occur in up to 21% of patients dying of cancer.[1] The incidence of clinically detectable disease is estimated to be 8·5% of necropsy documented cases.[2] Patients with malignant pericardial effusions often present with cardiac tamponade, a potentially fatal condition. Conservative treatment with pericardial sclerosis has been advocated recently.[3] We report our experience in 20 patients with malignant pericardial effusion treated with ultrasonography guided intrapericardial instillation of mitomycin C.

Methods

Twenty patients with malignant pericardial effusion were studied, and all had symptoms or signs of tamponade confirmed by echocardiography.

When the diagnosis of tamponade was established, ultrasound guided pericardiocentesis was performed with a linear array probe. A 16-gauge or 14-gauge needle was advanced through a subxiphisternal or parasternal approach into the pericardial sac under ultrasound guidance. An 18-gauge or 16-gauge catheter was then introduced and the needle removed. The maximum possible volume of pericardial fluid was drained and mitomycin C (8 mg in 10 ml normal saline) was then instilled. The catheter was either kept in place (case no. 19) or removed (all other cases). The patient had bedside ECG monitoring, and follow up ultrasonography was performed daily or every other day. If fluid reaccumulated the instillation procedure was repeated daily or every other day. Patient no. 19 had her catheter removed two days after the instillation. Weekly blood counts were carried out for two weeks. Four patients received concomitant systemic chemotherapy. No patient received corticosteroids.

The criteria of Smith *et al*[4] were used to evaluate the results including (1) decrease or disappearance of pericardial effusion for >30 days; (2) absence of symptoms of tamponade for >30 days; (3) no need for further pericardiocentesis for >30 days. The survival time was from the date of the last dose of mitomycin C to death or the last day of follow up. The effusion-free period was from the day of the last treatment to recurrence or the last follow up day.

Results

The age, sex, diagnosis, dose of mitomycin C, length of effusion-free periods, and survival time of 20 patients are presented in the table. Malignant pericardial effusion was cytologically confirmed in 17, and was strongly suspected in the other three. The effusions were bloody and there were no other causes found for the effusions.

The 20 patients drained a mean volume of 1344 ml pericardial fluid, and received one to four instillations of mitomycin C (median two) with successive instillations separated by 1–2 days. Ten survived for >30 days without recurrence of the effusion but it recurred after 30 days in four subjects. All of these 14 patients met the criteria of Smith *et al*[4] for a successful result. Six received one instillation of mitomycin C, three received two instillations, and five three instillations. Their median effusion-free time was 72·5 days, with a median survival of 101 days. Two died within 30 days without recurrence of effusion, but in four patients the effusions were not controlled.

Department of Clinical Pathology
L-N Lee
K-T Luh

Department of Internal Medicine
P-C Yang
D-B Chang
C-J Yu
J-C Ko
Y-S Liaw
R-G Wu

National Taiwan University Hospital, No 7 Chung Shan South Road, Taipei, Taiwan 10002

Reprint requests to:
Dr Li-Na Lee.

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Details of the 20 patients with malignant pericardial effusion

Case no.	*Sex/age*	*Primary tumour*	*Total volume withdrawn by pericardiocentesis (ml)*	*Dose of mitomycin C (mg)*	*Effusion-free period (days)*	*Survival (days)*
1	F/42	Lung (adeno)	1370	24(3)*	44	57
2	M/56	Lung (adeno)	550	8(1)	106	106
3	M/60	Lung (adeno)	1800	24(3)	256	256
4	M/48	Lung (adeno)	1600	8(1)	31	31
5	F/31	Lung (adeno)	3230	32(4)	23	23
6	F/24	Lung (adeno)	1730	24(3)	68	104
7	F/53	Lung (adeno)	250	16(2)	73	73
8	F/32	Lung (adeno)	1460	24(3)	43	109
9	F/60	Lung (adeno)	2060	24(3)	30	49
10	M/59	Lung (small cell)	680	8(1)	47	47
11	M/54	Lung (squam)	1600	8(1)	1	1
12	F/75	Lung (squam)	680	16(2)	19	27
13	M/73	Lung (squam)	610	8(1)	13	13
14	F/55	Lung (squam)	1820	8(1)	1	5
15	M/65	Unknown (adeno)	560	8(1)	109+	109+
16	M/66	Unknown (adeno)	1685	8(1)	102+	102+
17	F/61	Unknown (adeno)	550	16(2)	100	100
18	F/39	Breast	2450	16(2)	198	256
19	F/34	Thyroid	1000	8(1)	72	72
20	F/57	Stomach	1200	16(2)	6	9

Adeno = adenocarcinoma; squam = squamous cell carcinoma.
* Number in parentheses indicates the number of mitomycin C instillations.

No complications such as pain, arrhythmias, hypotension, or fever occurred. All blood counts after mitomycin C were normal. One subject developed pericardial constriction after seven months.

Discussion

Treatment options for malignant pericardial effusion include creation of a pericardial window, systemic chemotherapy, and intrapericardial sclerosis or chemotherapy.[3 5-8] Intrapericardial sclerosis or chemotherapy has recently become increasingly favoured. Agents used have included sclerosing agents such as tetracycline[3] and OK-432,[5] and cytotoxic drugs such as bleomycin,[6] mechlorethamine, thiotepa, atabrine,[4] 5-fluorouracil,[7] and cisplatin.[8] Success rates with these cytotoxic drugs are difficult to determine because of the small numbers treated. Success rates with sclerosing agents have been high, from 91% for tetracycline[3] to 100% for OK-432.[5] Complications occurred relatively frequently, however, and were sometimes severe.[3 5] A suitable alternative is mitomycin C, intrapleural instillation of which is safe and effective in controlling malignant pleural effusions.[9] It was effective in controlling pericardial effusion in 14 of our 20 patients, with the treatment effective after one instillation in six, and after two in a further three patients. These results are comparable to those with tetracycline.[3] We did not have a parallel group, and the numbers were small, so we cannot conclude that mitomycin C was more effective than tetracycline. However, it was well tolerated and did not cause pain, obviating the need for simultaneous injection of lignocaine, nor were there fevers, hypotension, or rapid reaccumulation of pericardial fluid which was a problem with OK-432 instillation.[5]

In summary, intrapericardial instillation of mitomycin C is a safe and reasonably effective treatment for malignant pericardial effusion. Thoracic ultrasonography is useful in guiding pericardiocentesis.

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