rehydration however claim that thirst is not the only relevant symptom in dehydration, and the accompanying fatigue, malaise, behavioural disturbance and delirium can be reversible. Subcutaneous fluid is a good alternative to intravenous rehydration that should be considered. However evidence is still far from firmly established, and forced hydration must not be routine practice.

Food and hydration is evidently a complex issue at the end of life. There may yet be also other concerns which can not be overlooked, eg societal views from euthanasia debate, sentimental concern from family, and religious perspective on sanctity of life. Real case scenarios were presented in the symposium illustrating the various processes in decision-making.

References:
1. Working group on clinical ethics of the Hospital Authority Clinical Ethics Committee. HA guidelines on life-sustaining treatment in the terminally ill. April 2002; Hong Kong.

Palliative Radiotherapy
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Introduction
Radiotherapy is one of the main treatments for cancer patients. About 34% to 50% of the patients receiving radiotherapy are treated with palliative intent. A Canadian study reported that 28.6% adult patients died of cancer had received palliative radiotherapy with 24% within 9 months before death. However, this treatment modality seems to be under-utilized in end of life care of cancer patients.

Mechanism of Symptom Relief by Radiotherapy
The exact pathophysiologic mechanism of symptom relief and functional improvement by radiotherapy is not completely understood. Radiotherapy is the process of treatment using high-energy ionizing radiation to damage the cellular DNA of the cancer cells, leading to death of the cancer cells in subsequent mitosis. With shrinkage of the tumour after killing of cancer cells, the symptoms due to compression or infiltration of normal tissue by the cancer will be relieved. Under this mechanism, it will take
several days to a few weeks before palliative radiotherapy achieves the therapeutic effects. However, some symptoms, such as metastatic bone pain, can be relieved soon after irradiation. The underlying mechanism of this prompt relief may be related to cytotoxic effects of irradiation on stromal cells, inhibiting release of chemical mediators of pain 7–8.

**Decision on giving palliative radiotherapy**

In contrast to radical radiotherapy, which aims to eradicate all the cancer cells with minimal acute and chronic side effects, palliative radiotherapy aims to achieve durable symptom relief and to improve the quality of life with avoidance of significant acute side effects during the patient’s limited life span. The outcomes of palliative radiotherapy are more difficult to qualify and quantify. As any other sphere of medicine, the practice of palliative radiotherapy is founded on the basic ethical principles 9 and should be guided by available clinical evidence. Decision on giving palliative radiotherapy requires sophisticated assessment to balance the potential benefits and burdens to the patients with respect to patient’s autonomy and expectation, and consideration of patients’ factors and logistic factors.

**Benefits and Burdens**

Radiotherapy can relieve various common symptoms in cancer patients; prevent debilitating symptoms such as spinal cord compression and pathological fracture; and achieve durable locoregional control of patients with advanced locoregional cancer. Table 1 summarizes the indications of palliative radiotherapy. Bone metasataes, thoracic cancers and brain metastases are the most common indications of palliative radiotherapy 2.

The effectiveness of palliative radiotherapy has been confirmed by cumulative clinical evidence. Palliative radiotherapy to metastatic bone pain can achieve an overall pain response rate of 58.7% to 62.1%, and a complete pain response rate of 32% to 34% 10. For the multiple brain metastases, the overall response rate to external beam irradiation is around 60% with 30% to 40% achieving marked neurological improvement 11.

On the other hand, palliative radiotherapy will cause burdens to the patient. These include acute side effects of irradiation, hospitalization, multiple visits to the treatment machine with associated discomfort in transport, and loss of opportunity cost 12. Patient may be away from family, loved ones and meaningful activities if treated with a protracted fractionated course of palliative radiotherapy 5. The acute transient side effects of radiation are often a more consideration in palliative radiotherapy than in curative radiotherapy. In contrast, the late complications can sometimes be disregard in view of relative short life span of patient13.

**Table 1: Indications of Palliative Radiotherapy**

<table>
<thead>
<tr>
<th>Pain relief:</th>
<th>Metastatic bone pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain due to soft tissue infiltration by cancers</td>
<td></td>
</tr>
<tr>
<td>Neuropathic pain due to compression and infiltration of nerves.</td>
<td></td>
</tr>
</tbody>
</table>

**Rescue of neurological deficit**

- Spinal cord compression
- Brain metastases

**Relief of pressure symptoms**

- Thoracic tumours:
  - SVCO
  - Upper airway obstruction
  - Dysphagia
  - Collapse of lung
- Reduced the increased intracranial pressure secondary to brain metastases
- Retroperitoneal tumours
  - Relief of hydronephrosis
- Pelvic tumours
  - Relief of hydronephrosis
  - Urinary retention
  - Intestinal obstruction

**Control of fungation and ulceration of metastatic or primary skin cancers**

**Haemostasis:**

- Haemoptysis
- Bleeding rectal or gynaecological cancers
- Bleeding skin cancers

**Prophylaxis of impending symptoms**

- Prevention of spinal cord compression
- Prevention of pathological fracture
- Prevention of pending pressure symptoms

**Durable control of advanced locoregional disease beyond cure.**
Patient’s Factors and Logistic Factors

A number of studies of patterns of practice have demonstrated that the use of palliative radiotherapy varies markedly among oncologists 14-16. The practice of palliative radiotherapy is also influenced by factors unrelated to the patients needs such as resource limiting, oncology training, access to the radiotherapy facilities, waiting time to treatment, patients’ age and patients’ household income 2, 17-18. A Canadian survey showed that young patients and those who have higher household income had higher chance to receive palliative radiotherapy than elderly patients and those who have lower household income respectively 2.

Poor performance status and short predicted life expectancy together with the perception of slow onset of therapeutic effects and overly burdensome of palliative radiotherapy to patients 5, often preclude the consideration of palliative radiotherapy as a tool for symptom relief in terminal cancer patients. However, it is noted that physicians are bad at estimating patients’ life expectancy 9; poor performance status may be the consequence of uncontrolled symptom; and the onset of the therapeutic effect of radiotherapy to some common symptoms, such as malignant bone pain and bleeding caused by cancer, can be rapid. With appropriate patient selection by thorough assessment, palliative radiotherapy could have a significant role in symptom control in end of life care of cancer patients. "One-stop approach" with the patient assessed, planned and treated by a single fraction on the same day will be useful in this group of patients 19.

Fractionation

Short fractionation schedules or single dose with lower total dose are often employed in palliative radiotherapy so as to minimize acute side effects, and to avoid multiple visits to treatment facilities and prolonged hospitalization. This will be more cost-effective and can shorten the waiting time to treatment. In the past two decades, there were increasing clinical evidences suggesting same effectiveness of shorter fractionation schedules as compared with more protracted schedules in symptom control of incurable cancer patients, particularly, for metastatic bone pain 20-22 and multiple brain metastases 23-25.

External irradiation using single dose of 8Gy has been recommended as an effective and appropriate treatment for palliation of metastatic bone pain unassociated with spinal cord compression and pathological fracture 26, although the relative efficacy beyond 12 months as compared with conventional multi-fraction treatment is not well defined. However, a recent reported meta-analysis showed an inferior effectiveness of single dose to fractionated course in preventing pathological fracture 22. The optimal fractionation for the neuropathic pain complicating bone metastases and pathological fracture are not established 26.

Consensus on palliative radiotherapy to multiple brain metastases was made after a workshop on palliative radiotherapy based on some important prognostic factors 27. Whole brain irradiation of a dose of 12 Gy in two fractions was recommended for patients whose likely prognosis is poor, and a dose of 20Gy in five fractions or a dose of 30Gy in ten fractions was recommended for patients with more favorable prognosis.

For patients with inoperable non-small cell carcinoma of lung cancer and poor performance status, studies 28-29 also demonstrated that one- or two-fraction schedules were equivalent to more prolonged higher dose regimens in terms of symptom control but with a reduced risk of acute morbidity.

In some clinical situations, more protracted fractionated course of palliative radiotherapy will be more favorable than shorter hypofractionated schedule. (1) For patients who have advanced locoregional cancers without distant metastases, such as head and neck cancer, and have good performance status and expected long life span, the aim of palliative radiotherapy
is to achieve durable local control. Protracted fractionated schedule with higher total dose but small dose per fraction will be favourable. (2) For lesions inside the pelvis or abdomen, radiation with large dose per fraction will lead to severe acute enteritis, especially if the patient has past history of abdominopelvic operation. In order to avoid such side effects, relative protracted course with lower dose per fraction will be favourable.

Conclusion

Radiotherapy is an effective palliative treatment modality in incurable cancer patients. With appropriate fractionation and meticulous planning, the potential burdens would be minimal. In end of life care of terminal cancer patients, this treatment modality has a definite role in symptom control and should not be precluded.

Reference: