Treatment for “solitary” brain metastases: What is best?

A great challenge posed to many lung cancer patients is spread of lung cancer to the brain. Indeed this is a scary event, for which no one can be adequately prepared. Fortunately however, many treatment options do exist which can effectively control brain metastases in many cases. In general, surgery and radiation are the key tools to address cancer when it has spread to the brain. Chemotherapy and other systemic therapies typically do not penetrate the brain region very well, and hence are not particularly active against brain metastases.

For solitary brain metastasis, surgery is often employed upfront for both diagnosis and therapy. The term solitary (as opposed to “single”) is often used to connote the presence of no additional cancer metastases elsewhere in the body. In the case of a solitary brain metastasis, there is sometimes doubt as to whether a brain lesion is in fact a metastasis. In this case, surgical biopsy or resection of the suspect lesion can confidently rule out other possibilities such as infection or a primary brain tumor. Surgery also can decompress swelling and help reduce any associated symptoms that a lesion may be causing. Of course, surgery also can carry risks, though in most cases the neurosurgeon can accurately assess risks prior to surgery based on the location of the lesion within the brain. Neurosurgeons also have a wide variety of techniques available to them in order to be sure that the surgical procedure is not causing injury. Often part of the surgery may be done while the patient is awake – achieving the ultimate careful assessment of neurological function during surgery.

Following surgery for a solitary brain metastasis, the greatest area at risk for metastatic progression in the brain is the very site from which the initially detected metastasis was surgically resected. This area is at very high risk – there is approximately a 70-80% risk of metastatic progression at this initial site following surgery alone. Elsewhere in the brain following surgery for a solitary brain metastasis, the risk of detecting additional metastases over the next year is approximately 50% – still a very high-risk, but not quite as high as the site of the initial metastatic lesion. In order to address the risks of cancer relapse at the initial site of disease or elsewhere in the brain, we consider whole brain radiotherapy, and often as an alternative to whole brain radiotherapy, stereotactic radiosurgery to the surgical resection cavity alone. Surgery followed by whole brain irradiation is a more traditional approach. As well, surgery + whole brain irradiation (in comparison to surgery alone) has been shown to be superior at preventing neurologic death, though not overall survival in a randomized trial. Whereas, surgery followed by stereotactic radiosurgery to the resection cavity (without whole brain irradiation) is an evolving paradigm, without the support of a randomized trial, though with good reported outcomes in non-randomized studies.

The pivotal question is: for which patients with a solitary brain metastasis, is surgery followed by radiosurgery to the resection cavity enough, obviating the need for immediate whole brain radiotherapy? This is a question which many patients face, and one for which there is no standard answer. It really depends on many factors surrounding the patient, his or her disease, goals, and greatest concerns. In general, surgery followed by stereotactic radiosurgery to the surgical resection cavity is safe and effective, addressing the brain area at the highest risk of recurrence and diminishing that risk significantly. Stereotactic radiosurgery “boost” to the
resection cavity does not carry the side effect profile of whole brain irradiation, though does not decrease the risk of developing other areas of metastasis within the brain. While whole brain irradiation addresses both the initial site of resected metastasis as well as the rest of the brain, there is potential for greater side effects, though sometimes the true risks associated with whole brain radiation are exaggerated.

If whole brain irradiation is deferred in favor of stereotactic radiosurgery, close followup is very important – repeat brain MRIs on a regular interval are necessary. That being said, close followup is important even if whole brain irradiation is performed as well. Though the risk of other brain metastases drops with whole brain irradiation down from 50%, it does not drop to zero. Even after whole brain irradiation, there is a risk of 10-30% of developing additional brain metastases.

What about radiation therapy alone for a solitary brain metastasis? It has been shown that surgery + whole brain irradiation is better than whole brain irradiation alone – in fact, a study comparing these two treatments showed that surgery preceding whole brain irradiation led to significantly improved overall survival (Patchell et al., New England Journal of Medicine, 1990). However, for some patients that are not good candidates for surgery or surgery is not considered to be of benefit, stereotactic radiosurgery may offer excellent local control of a solitary lesion, by itself or in combination with whole brain irradiation. As well, in some situations, simple whole brain radiation, all by itself, may be the best therapy. Again, the best path of treatment is very specific to a patient’s individual circumstances. There are a multitude of options.

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