Getting fair result from unfair coin

Question: We have a weighted coin which shows a Head with probability p, $(0.5 < p < 1)$. How do we get a fair toss from this? That is, how do we toss this coin in such a way that we can have probability of winning = loosing = 50%?

Solution: Let $win = \{head, tail\}$ and $loose = \{tail, head\}$. Then $P(win) = P(lose)$.

Use naive rejection, toss the weighted coin twice. If not $\{head, tail\}$ or $\{tail, head\}$, discard the result. Thus, $P(win) = P(loose) = 0.5$.

Follow up: I proposed a faster method, "lets keep tossing the coin to form a sequence of H's and T's . I win if HT appears before TH" . Was I bluffing?

Solution: Yes. Note if the first toss is H, then I always win; and if the first toss is T, then I always loose.